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Plants with increased activity of a Class 3 branching enzyme

Description

[001] The present invention relates to plant cells and plants, which are genetically modified, wherein the genetic modification leads to an increase in the activity of a Class 3 vegetable branching enzyme in comparison with corresponding wild type plant cells or wild type plants that have not been genetically modified. Furthermore, the present invention relates to means and methods for the manufacture of such plant cells and plants. Plant cells and plants of this type synthesise a modified starch. The present invention therefore also relates to the starch synthesised by the plant cells and plants according to the invention as well as to methods for the manufacture of the starch and to the manufacture of starch derivatives of this modified starch.

[002] With regard to the increasing importance currently attributed to vegetable constituents as renewable raw material sources, one of the tasks of biotechnological research is to endeavour to adapt these vegetable raw materials to suit the requirements of the processing industry. Furthermore, in order to enable regenerating raw materials to be used in as many areas of application as possible, it is necessary to achieve a large variety of materials.

[003] Polysaccharide starch is made up of chemically uniform base components, the glucose molecules, but constitutes a complex mixture of different molecule forms, which exhibit differences with regard to the degree of polymerisation and branching, and therefore differ strongly from one another in their physical-chemical characteristics. Discrimination is made between amylose starch, an essentially unbranched polymer made from α-1,4-glycosidically linked glucose units, and the amylopectin starch, a branched polymer, in which the branches come about by the occurrence of additional α-1,6-glycosidic links. A further essential difference between amylose and amylopectin lies in the molecular weight. While amylose, depending on the origin of the starch, has a molecular weight of $5 \times 10^5 - 10^6$ Da, that of the amylopectin lies between 10^7 and 10^8 Da. The two macromolecules can be differentiated by their molecular

weight and their different physical-chemical characteristics, which can most easily be made visible by their different iodine bonding characteristics.

[004] Amylose has long been looked upon as a linear polymer, consisting of α-1,4-glycosidically linked α-D-glucose monomers. In more recent studies, however, the presence of α-1,6-glycosidic branching points (ca. 0.1%) has been shown (Hizukuri and Takagi, Carbohydr. Res. 134, (1984), 1-10; Takeda et al., Carbohydr. Res. 132, (1984), 83-92).

[005] Amylopectin constitutes a complex mixture of differently branched glucose chains. In contrast to amylose, amylopectin is more strongly branched. According to textbook information (Voet and Voet, Biochemistry, John Wiley & Sons, 1990), on average, the α-1,6 branches occur every 24 to 30 glucose residues. This is equivalent to a degree of branching of ca. 3% - 4%. The figures for the degree of branching are variable and are dependent on the origin (e.g. plant species, plant type etc.) of the appropriate starch. In typical plants used for the industrial production of starch, such as maize, wheat or potato, for example, the synthesised starch consists of ca. 20% - 30% amylose starch and ca. 70% - 80% amylopectin starch.

[006] The functional characteristics of the starch, along with the amylose/amylopectin ratio and the phosphate content, are strongly affected by the molecular weight, the pattern of the side chain distribution, the ion concentration, the lipid and protein content, the average grain size of the starch and the grain morphology of the starch etc. At the same time, by way of example, the solubility, the retrogradation behaviour, the water bonding capability, the film formation characteristics, the viscosity, the sticking characteristics, the freezing-thawing stability, the acid stability, the gelling strength etc. must be mentioned as important functional characteristics. The grain size of the starch can also be important for different applications.

[007] Branching enzymes, which are also abbreviated by the designation "BE" (from <u>B</u>ranching <u>E</u>nzyme; E.C. 2.4.1.18), catalyse the introduction of α-1,6 branches in α-1,4-glucans. Branching enzymes and the nucleic or amino acid sequences that characterise them are known from widely different organisms, such as bacteria, microbial fungi, mammals, algae and higher plants, for example. As only plants synthesise starch, while the above-mentioned non-vegetable

organisms (e.g. bacteria, fungi and mammals) synthesise glycogen, the related branching enzymes, which are involved in the synthesis of the appropriate polymer, can also be sub-divided into glycogen branching enzymes and starch branching enzymes. Plants are therefore starch branching enzymes, which are often also referred to as Q-enzymes in older literature.

[008] In all plant species that have been investigated up to now, the branching enzymes described can be associated with two different classes (Burton et al., 1995, Plant Journal 7, 3-15; Mizuno et al., 2001, Plant Cell Physiol. 42(4), 349-357). The association with these classes, sometimes designated in the literature with A or 2 respectively and B or 1 respectively, is based on the comparison of derived protein sequences.

[009] As different nomenclatures have been used in the past for designating and classifying branching enzymes, Smith-White and Preiss (1994, Plant Molecular Biology Reporter 12, 67-71) (1994, Plant Molecular Biology Reporter 12, 67-71) have proposed a system for standardising this nomenclature, in which the association with the two classes of vegetable branching enzymes is also based on the comparison of derived protein sequences (Larsson et al., 1998, Plant Mol. Biol. 37, 505-511). According to this nomenclature, those vegetable branching enzymes, the amino acid sequence of which has a higher degree of identity with that of branching enzyme I of maize (GenBank Acc: D11081), is to be designated as a Class 1 branching enzyme, and those vegetable branching enzymes, the coding amino acid sequence of which has a higher degree of identity with that of branching enzyme II of maize (GenBank Acc: AF072725), is to be designated as a Class 2 branching enzyme. The designation of gene products, which are coding for branching enzymes, are, in accordance with the nomenclature of Smith-White and Preiss, to be incorporated in the already existing nomenclature by means of E.C. numbers. This results in the so-called GPN (Gene Product Number) Codes for the two classes, namely GPN 2.2.4.1.18:1 for Class 1 branching enzymes and GPN 2.2.4.18:2 for Class 2 branching enzymes.

[0010] The following vegetable or starch branching enzymes therefore belong to Class 1 (GPN 2.2.1.18:1) according to the nomenclature proposed by Smith-White and Preiss (1994, Plant Molecular Biology Reporter 12, 67-71): BE I from *Aegilops tauschii* (GenBank Acc: AF525746), BE I from barley (GenBank Acc: AY304541), BE from tapioca (GenBank Acc:

X77012), BE I (frequently also described as BE 1) from rice (GenBank Acc: D11082, D10752, D10838), BE 3 from bean (GenBank Acc: AB029549), BE II from pea (GenBank Acc: X80010), BE from millet (GenBank Acc: AF169833), BE I from potato (GenBank Acc: Y08786, X69805), BE from wheat (GenBank Acc: Y12320, AF076679, AF002820) and BE I from maize (GenBank Acc: D11081, AAO20100, E03435, AY176762, U17897, AF072724). At the same time, the amino acid sequences for different Class 1 branching enzymes each have an identity of more than 60% with the amino acid sequence of branching enzyme I from maize (GenBank Acc: D11081).

[0011] Branching enzymes, which belong to Class 2 (GPN 2.2.1.18:2) according to the nomenclature proposed by Smith-White and Preiss (1994, Plant Molecular Biology Reporter 12, 67-71) are, for example, BE IIa from *Aegilops tauschii* (GenBank Acc: AF338431, WO 9914314), BE2-1 and BE2-2 from *Arabidosis thaliana* (BE2-1 GenBank Acc: NM_129196 CAA04134; BE2-2 GenBank Acc: CAB82930, NM_120446), BE IIa and BE IIb from barley (BE IIa GenBank Acc: AF064560; BE IIb GenBank Acc: AF064561), BE II from sweet potato (GenBank Acc: AB071286), BE III and BE IV (frequently also described as BE 3 or BE 4 respectively) from rice (BE III GenBank Acc: D16201; BE IV GenBank Acc: AB023498), BE 1 from bean (GenBank Acc: AB029548), BE I from pea (GenBank Acc: X80009), BE IIb from millet (GenBank Acc: AY304540), BE II from potato (GenBank Acc: AJ000004, AJ011885, AJ011888, AJ011889, AJ011890), BE II or BE IIa from wheat (GenBank Acc: Y11282, AF286319, AF338432, U66376) and BE II, or BE IIb from maize (BE II GenBank Acc: AAA18571, T02981; BE IIb GenBank Acc: AF072725, L08065). At the same time, the amino acid sequences for different Class 2 branching enzymes each have an identity of more than 60% with the amino acid sequence of branching enzyme IIb from maize (GenBank Acc: AF072725).

[0012] Vegetable or starch branching enzymes belong to the family of alpha-amylolytic enzymes (Svensson, 1994, Plant Molecular Biology 25, 141-157; Jespersen et al., 1991, Biochem J. 280, 51-55) and, with regard to the amino acid sequence, have four conserved domains (Baba et al., 1991, Biochem. Biophys. Res. Commun. 181(1), 87-94; Kuriki et al., 1996, J. of Protein Chemistry 15(3), 305-313).

[0013] Structural predictions based on mathematical calculations derived from experimental

data such as protein crystal structures (Pfam: http://hits.isb-sib.ch/cgi-bin/PFSCAN?) show that all previously known branching enzymes from higher plants have two domains: an alpha-amylase domain and an iso-amylase domain. Here, the iso-amylase domain lies closer to the N-terminus of the protein than the alpha-amylase domain.

[0014] Plants are known, for example, which have a reduced activity of a Class 2 branching enzyme due to a mutation. These include the so-called "*amylose extender*" (*ae*) mutants from maize (Stindard et al., 1993, Plant Cell 5, 1555-1566; Boyer and Preiss, 1978, Biochem. Biophys. Res. Commun. 80, 169-175) and rice (Mizuno et al., 1993, J. Biol. Chem. 268, 19084-19091), as well as the "*rugosus*" (r) mutation in pea (Smith, 1988, Planta 175, 270-279; Bhattacharyya et al., 1990, Cell 60, 115-122). All these mutants are distinguished by the fact that they synthesise a starch, which has an increased amylose content in comparison with starches from corresponding plants, which do not have this mutation.

[0015] Furthermore, genetically modified potato plants are described, in which the activity of a BE I (Class 1) branching enzyme (Kossmann et al., 1991, Mol Gen Genet 230, 39-44; Safford et al., 1998, Carbohydrate Polymers 35, 155-168), or the activity of a BEII (Class 2) branching enzyme (Jobling et al., 1999, The Plant Journal 18), or the activity of a BEI and BEII branching enzyme (Schwall et al., 2000, Nature Biotechnology 18, 551- 554, Jobling et al., 2003, Nature Biotechnology 21, 77-80) are reduced.

[0016] Previously, it has been possible to associate all vegetable branching enzymes to one or both of the classes described above. Plant cells or plants, which have an increased activity of a branching enzyme, which cannot be associated with these classes, are unknown.

[0017] The object of the present invention is therefore based on providing modified starches, new plant cells and/or plants, which synthesise such a modified starch, as well as methods for producing said plants.

[0018] This problem is solved by the embodiments described in the claims.

[0019] The present invention therefore relates to genetically modified plant cells and plants, characterised in that the plant cells or plants have an increased activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells or wild type plants that have not been genetically modified.

[0020] A first aspect of the present invention relates to a plant cell or plant, which is genetically modified, wherein the genetic modification leads to an increase in the activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells or wild type plants that have not been genetically modified.

[0021] At the same time, the genetic modification can be any genetic modification, which leads to an increase in the activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells or wild type plants that have not been genetically modified.

[0022] In conjunction with the present invention, the term "wild type plant cell" means that the plant cells concerned were used as starting material for the manufacture of the plant cells according to the invention, i.e. their genetic information, apart from the introduced genetic modification, corresponds to that of a plant cell according to the invention.

[0023] In conjunction with the present invention, the term "wild type plant" means that the plants concerned were used as starting material for the manufacture of the plants according to the invention, i.e. their genetic information, apart from the introduced genetic modification, corresponds to that of a plant according to the invention.

[0024] In conjunction with the present invention, the term "corresponding" means that, in the comparison of several objects, the objects concerned that are compared with one another have been kept under the same conditions. In conjunction with the present invention, the term "corresponding" in conjunction with wild type plant cell or wild type plant means that the plant cells or plants, which are compared with one another, have been raised under the same cultivation conditions and that they have the same (cultivation) age.

[0025] The plant cells according to the invention have an increased activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells that have not been genetically modified.

[0026] Here, within the framework of the present invention, the term "increased activity" means an increase in the expression of endogenous genes, which code Class 3 branching enzymes and/or an increase in the quantity of Class 3 branching enzyme protein in the cells and/or an increase in the enzymatic activity of Class 3 branching enzymes in the cells.

[0027] The increase in the expression can, for example, be determined by measuring the quantity of transcripts coding Class 3 branching enzyme, e.g. using Northern blot analysis or RT-PCR. Here, an increase preferably means an increase in the amount of transcripts in comparison with corresponding cells that have not been genetically modified by at least 50%, in particular by at least 70%, preferably by at least 85% and particularly preferably by at least 100%.

[0028] The increase in the amount of protein of a Class 3 branching enzyme, which results in an increased activity of this protein in the plant cells concerned, can, for example, be determined by immunological methods such as Western blot analysis, ELISA (Enzyme Linked Immuno Sorbent Assay) or RIA (Radio Immune Assay). Here, an increase preferably means an increase in the amount of Class 3 branching enzyme protein in comparison with corresponding cells that have not been genetically modified by at least 50%, in particular by at least 70%, preferably by at least 85% and particularly preferably by at least 100%.

[0029] Within the framework of the present invention, the term "branching enzyme" (α-1,4-glucan: α-1,4-glucan 6-glycosyltransferase, E.C. 2.4.1.18) is understood to mean a protein, which catalyses a transglycosylation reaction, in which α-1,4 links of an α-1,4-glucan donor are hydrolysed and the thereby released α-1,4-glucan chains are transferred to an α-1,4-glucan acceptor chain and, in doing so, are transformed into α-1,6-links. In particular, within the framework of the present invention, the term "branching enzyme" is to be understood to mean a vegetable branching enzyme, i.e. a starch branching enzyme.

[0030] The activity of a branching enzyme can be demonstrated, for example, with the help of native acrylamide gel electrophoresis. In doing so, proteins are first separated electrophoretically and, after incubation in buffers containing an activity, which synthesises linear α-1,4-glucan chains (e.g. starch phosphorylase a) and its substrate (e.g. glucose-6-phosphate), the corresponding gels are coloured with iodine (Kimihiko et al., 1980, Analytical Biochemistry 108, 16-24). Furthermore, branching enzymes in microbial organisms, such as the *E. coli* strain KV832 for example (Kiel et al., 1987 Mol. Gen. Genet 207: 294-301), which do not synthesise branched α-glucans, can be expressed. If an activity of a branching enzyme is introduced into the microbial organism due to the expression of a foreign gene in such strains (e.g. *E. coli* KV832), then the branching enzyme activity can be demonstrated by treating colonies of these organisms with iodine vapour, for example. Colonies, which synthesise linear α-1,4-glucans, turn blue in this test, while colonies, which synthesise branched glucans by expressing an additional enzymatic activity of a branching enzyme, turn reddish-brown after treating with iodine vapour. It is also possible to express proteins in phosphoglucomutase mutants of *E. coli* to identify a branching enzyme activity of appropriate proteins (Buettcher et al., 1999, Biochem. Biophys. Acta 1432, 406-412).

[0031] A further possibility of demonstrating branching enzyme activity of proteins is the use of a reaction stimulated by phosphorylase a and the subsequent separation of the products by means of thin film chromatography (Almstrupp et al., 2000, Analytical Biochemistry 286, 297-300). Branching enzyme activities can also be demonstrated with the help of the methods described in Guan and Preiss (1993, Plant Physiol. 102. 1269- 1273) and Kuriki et al. (1996, J. of Protein Chemistry 15, 305-313).

[0032] In conjunction with the present invention, the term "Class 3 branching enzyme" is to be understood as a branching enzyme, which has a higher degree of identity with the amino acid sequence specified in Seq ID NO 4 than with that of the branching enzyme BE I from maize (GenBank Acc: D11081) or with that of the branching enzyme BE IIb from maize (GenBank Acc: AF072725). Preferably, the Class 3 branching enzyme comes from starch-storing plants, particularly preferably from plant species of the genus *Solanum*, especially preferably from *Solanum tuberosum*.

[0033] In a further embodiment of the present invention, amino acid sequences coding Class 3 branching enzymes have an identity of at least 60% with the sequence specified in SEQ ID NO 4, in particular of at least 70%, preferably of at least 80% and particularly preferably of at least 90% and especially preferably of at least 95%.

[0034] According to the invention, Class 3 branching enzymes have an iso-amylase domain (Pfam acc.: Pf02922) and an alpha-amylase domain (Pfam acc: Pf00128). According to the invention, the iso-amylase domain and the alpha-amylase domain in amino acid sequences coding branching enzymes are separated from one another by the presence of further amino acids, which do not belong to these two domains.

[0035] Class 3 branching enzymes according to the invention are distinguished by the fact that the iso-amylase domain is separated from the alpha-amylase domain by a greater number of amino acids than the iso-amylase domain and the alpha-amylase domain of Class 1 and 2 branching enzymes.

[0036] Class 3 branching enzymes according to the invention are preferably distinguished with regard to their amino acid sequence by the fact that they have at least 70, preferably at least 100, particularly preferably at least 130 and especially preferably at least 198 amino acids between the iso-amylase domain and the alpha-amylase domain. In a further embodiment of the present invention, in the case of an amino acid sequence coding a Class 3 branching enzyme, the C-terminal end of the iso-amylase domain is separated from the N-terminal beginning of the alpha-amylase domain by 70 to 198, preferably by 100 to 198, particularly preferably by 130 to 198 and especially particularly preferably by 150 to 198 amino acids.

[0037] With the help of the Pfam database (Batemann et al., 2002, Nucleic Acids Research 30, 276-280; accessible via http://www.sanger.ac.uk/Software/Pfam/, http://www.cgb.ki.se/Pfam/; http://pfam.jouy.inra.fr/ or http://pfam.wustl.edu/), it is possible for the person skilled in the art to determine whether amino acid sequences already have known domains (e.g. an iso-amylase domain and/or an alpha-amylase domain). Pfam is a database put

together by experts, which classifies amino acid sequences into so-called families. Here, the assignment of an amino acid sequence to a family is carried out on the basis of so-called domains, which are to be looked upon as functional and structural components of proteins. A domain is defined as a structural unit or a repeatedly occurring amino acid sequence unit, which can occur in proteins with widely different functions. Along with information relating to the amino acid sequence of known proteins, further knowledge (e.g. evidence of the enzymatic activity, crystal structure data) is also used for the assignment of a protein to a family. Each family is assigned a name and an "accession" number (e.g. Name: Isoamylase_N, acc: PF02922). A constituent part of each family in the Pfam database is, amongst other things, a so-called "seed alignment". The "seed alignment" contains the amino acid sequences of representative proteins of a family. Starting from "seed alignments", a so-called profile HMM ("profile Hidden Markov Model"; overview article in: Durbin et al., "Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids", Cambridge University Press, 1998, ISBN 0-521-62041-4) is produced using the HMMER 2 software (freely available under http://hmmer.wustl.edu/). The HMMs produced have names and are stored in the Pfam database specifically for the correspondingly assigned domains. In contrast to classical, multiple "alignments" (e.g. produced using the Clustal W program or the Blossum62 algorithm), HMMs are based on a valid statistical theory (Bayes theory of conditional probability, Markoff chains) and enable an interrogation sequence (query) to be assigned to a family based on the use of position-specific evaluation matrices. This enables an assignment to be made even when there are considerable differences in the amino acid sequences between the interrogation sequence (Query) and a comparison sequence (e.g. amino acid sequence entry in a database).

[0038] The domain structure of the amino acid sequence concerned can be determined by means of a comparison of the HMMs stored in the Pfam database with amino acid sequences, which are entered as a so-called interrogation sequence (query) (e.g. under http://hits.isb-sib.ch/cgi-bin/PFSCAN?).

[0039] In conjunction with the present invention, the term "iso-amylase domain" is to be understood to mean a Pfam iso-amylase domain (acc: Pf02922). At the same time, the HMM describing this Pfam iso-amylase domain is to be produced with the HMMER 2 [2.3.1] software,

starting from a "seed alignment", which contains the amino acid sequences shown in Table 1. In conjunction with the present invention, the "seed alignment" is produced by means of the ClustalW program (Thompson et al., Nucleic Acids Research 22 (1994), 4673-4680; see below). The following settings must be chosen to produce the appropriate HMMs: Build Method of HMM: hmmbuild –F HMM_ls, hmmcalibrate –seed 0 HMM_ls; Gathering cutoff: 2.3 2.3; Trusted cutoff: 2.3 2.2; Noise cutoff: 2.1 2.1). Further information for producing the HMM of the Pfam iso-amylase domain (acc: Pf02922) is given in Table 3.

[0040] In conjunction with the present invention, the term "alpha-amylase domain" is to be understood to mean a Pfam alpha-amylase domain (acc: Pf00128). At the same time, the HMM describing this Pfam alpha-amylase domain is to be produced with the HMMER 2 [2.3.1] software, starting from a "seed alignment", which contains the amino acid sequences shown in Table 2. Here, the "seed alignment" is produced by means of HMM_simulated_annealing (http://www.psc.edu/general/software/packages/hmmer/manual/node11.html#SECTION00321000000000000000). The following settings must be chosen to produce the appropriate HMM: Build Method of HMM: hmmbuild –F HMM_ls, hmmcalibrate –seed 0 HMM_ls; Gathering cutoff: -82.0 –82.0; Trusted cutoff: -81.7 –81.7; Noise cutoff: -82.7 –82.7). Further information for producing the HMM of the Pfam alpha-amylase domain (acc: Pf00128) is given in Table 4.

[0041] In conjunction with the present invention, the term "Class 3 branching enzyme gene" is to be understood to mean a nucleic acid molecule (cDNA, DNA), which codes a Class 3 branching enzyme, preferably a Class 3 branching enzyme from starch-storing plants, particularly preferably from plant species of the genus *Solanum*, especially preferably from *Solanum tuberosum*.

[0042] A preferred embodiment of the present invention relates to a genetically modified plant cell according to the invention or a genetically modified plant according to the invention, wherein the genetic modification consists in the introduction of at least one foreign nucleic acid molecule into the genome of the plant cell or into the genome of the plant.

[0043] In this context, the term "genetic modification" means the introduction of homologous

and/or heterologous foreign nucleic acid molecules into the genome of a plant cell or into the genome of a plant, wherein said introduction of these molecules leads to an increase in the activity of a Class 3 branching enzyme.

[0044] The plant cells according to the invention or plants according to the invention are modified with regard to their genetic information by the introduction of a foreign nucleic acid molecule. The presence or the expression of the foreign nucleic acid molecule leads to a phenotypic change. Here, "phenotypic" change means preferably a measurable change of one or more functions of the cells. For example, the genetically modified plant cells according to the invention and the genetically modified plants according to the invention exhibit an increase in the activity of a Class 3 branching enzyme due to the presence or on the expression of the introduced nucleic acid molecule.

[0045] In conjunction with the present invention, the term "foreign nucleic acid molecule" is understood to mean such a molecule that either does not occur naturally in the corresponding wild type plant cells, or that does not occur naturally in the concrete spatial arrangement in wild type plant cells, or that is localised at a place in the genome of the wild type plant cell at which it does not occur naturally. Preferably, the foreign nucleic acid molecule is a recombinant molecule, which consists of different elements, the combination or specific spatial arrangement of which does not occur naturally in vegetable cells. In principle, the foreign nucleic acid molecule can be any nucleic acid molecule, which effects an increase in the activity of a Class 3 branching enzyme in the plant cell or plant.

[0046] In conjunction with the present invention, the term "genome" is to be understood to mean the totality of the genetic material present in a vegetable cell. It is known to the person skilled in the art that, as well as the cell nucleus, other compartments (e.g. plastids, mitochondrions) also contain genetic material.

[0047] In a further embodiment, the plant cells according to the invention and the plants according to the invention are characterised in that the foreign nucleic acid molecule codes a Class 3 branching enzyme, preferably a Class 3 branching enzyme from starch-storing plants,

particularly preferably from plants of a species of the genus *Solanum*, especially preferably from *Solanum tuberosum*.

[0048] In a particularly preferred embodiment, the foreign nucleic acid molecule codes a Class 3 branching enzyme with the amino acid sequence specified in SEQ ID NO 4.

[0049] A large number of techniques are available for the introduction of DNA into a vegetable host cell. These techniques include the transformation of vegetable cells with T-DNA using *Agrobacterium tumefaciens* or *Agrobacterium rhizogenes* as the transformation medium, the fusion of protoplasts, injection, the electroporation of DNA, the introduction of DNA by means of the biolistic approach as well as other possibilities. The use of agrobacteria-mediated transformation of plant cells has been intensively investigated and adequately described in EP 120516; Hoekema, IN: The Binary Plant Vector System Offsetdrukkerij Kanters B.V., Alblasserdam (1985), Chapter V; Fraley et al., Crit. Rev. Plant Sci. 4, 1-46 and by An et al. EMBO J. 4, (1985), 277-287. For the transformation of potato, see Rocha-Sosa et al., EMBO J. 8, (1989), 29-33, for example.

[0050] The transformation of monocotyledonous plants by means of vectors based on agrobacterium transformation has also been described (Chan et al., Plant Mol. Biol. 22, (1993), 491-506; Hiei et al., Plant J. 6, (1994) 271-282; Deng et al, Science in China 33, (1990), 28-34; Wilmink et al., Plant Cell Reports 11, (1992), 76-80; May et al., Bio/Technology 13, (1995), 486-492; Conner and Domisse, Int. J. Plant Sci. 153 (1992), 550-555; Ritchie et al, Transgenic Res. 2, (1993), 252-265). An alternative system to the transformation of monocotyledonous plants is transformation by means of the biolistic approach (Wan and Lemaux, Plant Physiol. 104, (1994), 37-48; Vasil et al., Bio/Technology 11 (1993), 1553-1558; Ritala et al., Plant Mol. Biol. 24, (1994), 317-325; Spencer et al., Theor. Appl. Genet. 79, (1990), 625-631), protoplast transformation, electroporation of partially permeabilised cells and the introduction of DNA by means of glass fibres. In particular, the transformation of maize has been described in the literature many times (cf. e.g. WO95/06128, EP0513849, EP0465875, EP0292435; Fromm et al., Biotechnology 8, (1990), 833-844; Gordon-Kamm et al., Plant Cell 2, (1990), 603-618; Koziel et al., Biotechnology 11 (1993), 194-200; Moroc et al., Theor. Appl. Genet. 80, (1990), 721-726).

[0051] The successful transformation of other types of cereal has also already been described, for example for barley (Wan and Lemaux, see above; Ritala et al., see above; Krens et al., Nature 296, (1982), 72-74) and for wheat (Nehra et al., Plant J. 5, (1994), 285-297). All the above methods are suitable within the framework of the present invention.

[0052] Amongst other things, the plant cells according to the invention and the plants according to the invention can be differentiated from wild type plant cells and wild type plants respectively in that they contain a foreign nucleic acid molecule, which does not occur naturally in wild type plant cells or wild type plants, or in that such a molecule is present integrated at a place in the genome of the plant cell according to the invention or in the genome of the plant according to the invention at which it does not occur in wild type plant cells or wild type plants, i.e. in a different genomic environment. Furthermore, plant cells according to the invention and plants according to the invention of this type differ from wild type plant cells and wild type plants respectively in that they contain at least one copy of the foreign nucleic acid molecule stably integrated within their genome, possibly in addition to naturally occurring copies of such a molecule in the wild type plant cells or wild type plants. If the foreign nucleic acid molecule(s) introduced into the plant cells according to the invention or into the plants according to the invention is (are) additional copies of molecules already occurring naturally in the wild type plant cells or wild type plants respectively, then the plant cells according to the invention and the plants according to the invention can be differentiated from wild type plant cells or wild type plants respectively in particular in that this additional copy or these additional copies is (are) localised at places in the genome at which it does not occur (or they do not occur) in wild type plant cells or wild type plants. This can be verified, for example, with the help of a Southern Blot Analysis.

[0053] Furthermore, the plant cells according to the invention and the plants according to the invention can preferably be differentiated from wild type plant cells or wild type plants respectively by at least one of the following characteristics: If the foreign nucleic acid module that has been introduced is heterologous with respect to the plant cell or plant, then the plant cells according to the invention or plants according to the invention have transcripts of the introduced nucleic acid molecules. These can be verified, for example, by Northern blot analysis or by RT-

PCR (Reverse Transcription Polymerase Chain Reaction). Plant cells according to the invention and plants according to the invention, which express an antisense and/or an RNAi transcript, can be verified, for example, with the help of specific nucleic acid probes, which are complimentary to the RNA (occurring naturally in the plant cell), which is coding for the protein. Preferably, the plant cells according to the invention and the plants according to the invention contain a protein, which is coded by an introduced nucleic acid molecule. This can be demonstrated by immunological methods, for example, in particular by a Western Blot Analysis.

[0054] If the foreign nucleic acid module that has been introduced is homologous with respect to the plant cell or plant, the plant cells according to the invention or plants according to the invention can be differentiated from wild type plant cells or wild type plants respectively due to the additional expression of the introduced foreign nucleic acid molecule, for example. The plant cells according to the invention and the plants according to the invention preferably contain (sense and/or antisense) transcripts of the foreign nucleic acid molecules. This can be demonstrated by Northern blot analysis, for example, or with the help of so-called quantitative PCR.

[0055] In a special embodiment, the plant cells according to the invention and the plants according to the invention are transgenic plant cells or transgenic plants respectively

[0056] In a further embodiment, the present invention relates to plant cells according to the invention and plants according to the invention wherein the foreign nucleic acid molecule is chosen from the group consisting of

a) Nucleic acid molecules, which code a protein with the amino acid sequence given under Seq ID NO 4;

b) Nucleic acid molecules, which code a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence given under SEQ ID NO: 4;

c) Nucleic acid molecules, which include the nucleotide sequence shown under Seq ID NO 3 or a complimentary sequence;

d) Nucleic acid molecules, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);

e) Nucleic acid molecules, which hybridise with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;

f) Nucleic acid molecules, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; and

g) Nucleic acid molecules, which represent fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).

[0057] The amino acid sequence specified in SEQ ID NO 4 codes a protein with the activity of a Class 3 branching enzyme from *Solanum tuberosum*.

[0058] A plasmid was deposited with the Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Mascheroder Weg 1b, 38124 Braunschweig, Germany, in accordance with the Budapest Treaty on 15th September 2003 under the number DSM 15926. The amino acid sequence shown SEQ ID NO 4 can be derived from the coding region of the cDNA sequence integrated in plasmid DSM 15926 and codes for a Class 3 branching enzyme from *Solanum tuberosum*. The present invention relates to nucleic acid molecules, which code a protein with the enzymatic activity of a Class 3 branching enzyme, which includes the amino acid sequence, which is coded by the insertion in plasmid DSM 15926, wherein the coded protein has an identity of at least 70%, preferably of at least 80%, particularly preferably of at least 90% and especially preferably of 95% with the amino acid sequence, which can be derived from the insertion coding a Class 3 branching enzyme in DSM 15926.

[0059] The proteins coded from the different varieties of nucleic acid molecules according to the invention have certain common characteristics. These can include, for example, biological activity, molecular weight, immunological reactivity, conformation, the presence of structural and/or functional domains etc, as well as physical characteristics such as, for example, the running behaviour in gel electrophoresis, chromatographic behaviour, sedimentation coefficients, solubility, spectroscopic characteristics, stability; optimum pH, optimum temperature etc.

[0060] The molecular weight of the Class 3 branching enzyme from *Solanum tuberosum*

derived from the amino acid sequence shown under SEQ ID NO 4 is ca. 103 kDa. The derived molecular weight of a protein according to the invention therefore preferably lies in the range from 85 kDa to 120 kDa, preferably in the range from 95 kDa to 110 kDa and particularly preferably from ca. kDa 100 to 105 kDa.

[0061] The nucleic acid sequence shown in SEQ ID NO 3 is a cDNA sequence, which includes the coding region for a Class 3 branching enzyme from *Solanum tuberosum*.

[0062] The present invention therefore also relates to nucleic acid molecules, which code a Class 3 branching enzyme and the coding region of the nucleotide sequence shown under Seq ID NO 3 or a complimentary sequence, nucleic acid molecules, which include the coding region of the nucleotide sequence of the insertion contained in plasmid DSM 15926, and nucleic acid molecules, which have an identity of at least 70%, preferably of at least 80%, particularly preferably of at least 90% and especially preferably of at least 95% with the said nucleic acid molecules.

[0063] With the help of the sequence information of the nucleic acid molecule according to the invention or with the help of the nucleic acid molecule according to the invention, it is now possible for the person skilled in the art to isolate homologous sequences from other plant species, preferably from starch-storing plants, preferably from plant species of the genus *Solanum*, particularly preferably from *Solanum tuberosum*. This can be carried out, for example, with the help of conventional methods such as the examination of cDNA or genomic banks with suitable hybridisation samples. The person skilled in the art knows that homologous sequences can also be isolated with the help of (degenerated) oligonucleotides and the use of PCR-based methods.

[0064] The examination of databases, such as are made available, for example, by EMBL (http://www.ebi.ac.uk/Tools/index.htm) or NCBI (National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov/), can also be used for identifying homologous sequences, which code for a Class 3 branching enzyme. In this case, one or more sequences are specified as a so-called query. This query sequence is then compared by means of statistical

computer programs with sequences, which are contained in the selected databases. Such database queries (e.g. blast or fasta searches) are known to the person skilled in the art and can be carried out by various providers. If such a database query is carried out, e.g. at the NCBI (National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov/), then the standard settings, which are specified for the particular comparison inquiry, should be used. For protein sequence comparisons (blastp), these are the following settings: Limit entrez = not activated; Filter = low complexity activated; Expect value = 10; word size = 3; Matrix = BLOSUM62; Gap costs: Existence = 11, Extension = 1.

[0065] For nucleic acid sequence comparisons (blastn), the following parameters must be set: Limit entrez = not activated; Filter = low complexity activated; Expect value = 10; word size = 11.

[0066] With such a database search, the sequences described in the present invention can be used as a query sequence in order to identify further nucleic acid molecules and/or proteins, which code a Class 3 branching enzyme.

[0067] With the help of the described methods, it is also possible to identify and/or isolate nucleic acid molecules according to the invention, which hybridise with the sequence specified under SEQ ID NO: 3 and which code a Class 3 branching enzyme.

[0068] Within the framework of the present invention, the term "hybridising" means hybridisation under conventional hybridisation conditions, preferably under stringent conditions such as, for example, are described in Sambrock et al., Molecular Cloning, A Laboratory Manual, 2nd Ed. (1989) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY). Particularly preferably, "hybridising" means hybridisation under the following conditions:

[0069] Hybridisation buffer: 2xSSC; 10xDenhardt solution (Ficoll 400+PEG+BSA; Ratio 1:1:1); 0.1% SDS; 5 mM EDTA; 50 mM Na_2HPO_4; 250 µg/ml herring sperm DNA; 50 µg/ml tRNA; or 25 M sodium phosphate buffer pH 7.2; 1 mM EDTA; 7% SDS

[0070] Hybridisation temperature: T=65 to 68°C

[0071] Wash buffer: 0.2xSSC; 0.1% SDS

[0072] Wash temperature: T=65 to 68°C.

[0073] In principle, nucleic acid molecules, which hybridise with the nucleic acid molecules according to the invention, can originate from any plant species, which expresses an appropriate protein, preferably they originate from starch-storing plants, preferably from species of the genus *Solanum*, particularly preferably from *Solanum tuberosum*. Nucleic acid molecules, which hybridise with the molecules according to the invention, can, for example, be isolated from genomic or from cDNA libraries. The identification and isolation of nuclear acid molecules of this type can be carried out using the nucleic acid molecules according to the invention or parts of these molecules or the reverse complements of these molecules, e.g. by means of hybridisation according to standard methods (see, for example, Sambrook et al., 1989, Molecular Cloning, A Laboratory Manual, 2nd Ed. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY) or by amplification using PCR.

[0074] Nucleic acid molecules, which exactly or essentially have the nucleotide sequence specified under SEQ ID NO: 3, or parts of this sequence, can be used as hybridisation samples. The fragments used as hybridisation samples can also be synthetic fragments or oligonucleotides, which have been manufactured using established synthesising techniques and the sequence of which corresponds essentially with that of a nucleic acid molecule according to the invention. If genes have been identified and isolated, which hybridise with the nucleic acid sequences according to the invention, then a determination of this sequence and an analysis of the characteristics of the proteins coded by this sequence should be carried out in order to establish whether a Class 3 branching enzyme is involved. Homology comparisons on the level of the nucleic acid or amino acid sequence and a determination of the enzymatic activity are particularly suitable for this purpose. As described above, the activity of a Class 3 branching enzyme can take place by expression in E. coli strains, which themselves do not express an active branching enzyme (Kiel et al., 1987 Mol. Gen. Genet 207: 294-301); Guan et al., 1995, Proc. Natl. Acad. Sci. 92, 964-967)..

[0075] The molecules hybridising with the nucleic acid molecules according to the invention particularly include fragments, derivatives and allelic variants of the nucleic acid molecules described above, which code a Class 3 branching enzyme from plants, preferably from starch-storing plants, preferably from plant species of the genus *Solanum*, particularly preferably from *Solanum tuberosum*. In conjunction with the present invention, the term "derivative" means that the sequences of these molecules differ at one or more positions from the sequences of the nucleic acid molecules described above and have a high degree of identity with these sequences. Here, the deviation from the nucleic acid molecules described above can have come about, for example, due to deletion, addition, substitution, insertion or recombination.

[0076] The proteins coded from the different derivatives of nucleic acid molecules according to the invention have certain common characteristics. These can include, for example, biological activity, substrate specificity, molecular weight, immunological reactivity, conformation, the presence of structural and/or functional domains etc, as well as physical characteristics such as, for example, the running behaviour in gel electrophoresis, chromatographic behaviour, sedimentation coefficients, solubility, spectroscopic characteristics, stability; optimum pH, optimum temperature etc.

[0077] In conjunction with the present invention, the term "identity" means a sequence identity over the whole length of the coding region of at least 60%, in particular an identity of at least 70%, preferably greater than 80%, particularly preferably greater than 90% and especially of at least 95%. In conjunction with the present invention, the term "identity" is to be understood to mean the number of amino acids/nucleotides (identity) corresponding with other proteins/nucleic acids, expressed as a percentage. Identity is preferably determined by comparing the Seq. ID NO 4 or SEQ ID NO 3 with other proteins/nucleic acids with the help of computer programs. If sequences that are compared with one another have different lengths, the identity is to be determined in such a way that the number of amino acids, which have the shorter sequence in common with the longer sequence, determines the percentage quotient of the identity. Preferably, identity is determined by means of the computer program ClustalW, which is well known and available to the public (Thompson et al., Nucleic Acids Research 22 (1994), 4673-4680).

ClustalW is made publicly available by Julie Thompson (Thompson@EMBL-Heidelberg.DE) and Toby Gibson (Gibson@EMBL-Heidelberg.DE), European Molecular Biology Laboratory, Meyerhofstrasse 1, D 69117 Heidelberg, Germany. ClustalW can also be downloaded from different Internet sites, including the IGBMC (Institut de Génétique et de Biologie Moléculaire et Cellulaire, B.P.163, 67404 Illkirch Cedex, France; ftp://ftp-igbmc.u-strasbg.fr/pub/) and the EBI (ftp://ftp.ebi.ac.uk/pub/software/) as well as from all mirrored Internet sites of the EBI (European Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, Cambridge CB10 1SD, UK).

[0078] Preferably, Version 1.8 of the ClustalW computer program is used to determine the identity between proteins according to the invention and other proteins. In doing so, the following parameters must be set: KTUPLE=1, TOPDIAG=5, WINDOW=5, PAIRGAP=3, GAPOPEN=10, GAPEXTEND=0.05, GAPDIST=8, MAXDIV=40, MATRIX=GONNET, ENDGAPS(OFF), NOPGAP, NOHGAP.

[0079] Preferably, Version 1.8 of the ClustalW computer program is used to determine the identity between the nucleotide sequence of the nucleic acid molecules according to the invention, for example, and the nucleotide sequence of other nucleic acid molecules. In doing so, the following parameters must be set: KTUPLE=2, TOPDIAGS=4, PAIRGAP=5, DNAMATRIX:IUB, GAPOPEN=10, GAPEXT=5, MAXDIV=40, TRANSITIONS: unweighted.

[0080] Furthermore, identity means that functional and/or structural equivalence exists between the nucleic acid molecules concerned or the proteins coded by them. The nucleic acid molecules, which are homologous to the molecules described above and constitute derivatives of these molecules, are generally variations of these molecules, which constitute modifications, which execute the same biological function. At the same time, the variations can occur naturally, for example they can be sequences from other plant species, or they can be mutations, wherein these mutations may have occurred in a natural manner or have been introduced by objective mutagenesis. The variations can also be synthetically manufactured sequences. The allelic variants can be both naturally occurring variants and also synthetically manufactured variants or variants produced by recombinant DNA techniques. Nucleic acid molecules, which deviate from

nucleic acid molecules according to the invention due to degeneration of the genetic code, constitute a special form of derivatives.

[0081] The nucleic acid molecules according to the invention can be any nucleic acid molecules, in particular DNA or RNA molecules, for example cDNA, genomic DNA, mRNA etc. They can be naturally occurring molecules or molecules manufactured by genetic or chemical synthesis methods. They can be single-stranded molecules, which either contain the coding or the non-coding strand, or double-stranded molecules.

[0082] Furthermore, the present invention relates to nucleic acid molecules of at least 21, preferably more than 50 and particularly preferably more than 200 nucleotides length, which specifically hybridise with at least one nucleic acid molecule according to the invention. Here, specifically hybridise means that these molecules hybridise with nucleic acid molecules, which code a protein according to the invention, but not with nucleic acid molecules, which code other proteins.

[0083] A further embodiment of the present invention relates to plant cells according to the invention and plants according to the invention wherein the foreign nucleic acid molecule is chosen from the group consisting of

a) T-DNA molecules, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (T-DNA activation tagging);

b) DNA molecules, which contain transposons, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (transposon activation tagging);

c) DNA molecules, which code a Class 3 branching enzyme and which are linked with regulatory sequences, which guarantee transcription in vegetable cells and lead to an increase in Class 3 branching enzyme activity in the cell.

d) Nucleic acid molecules introduced by means of in vivo mutagenesis, which lead to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects an increase in the expression of a gene coding a Class 3 branching enzyme.

[0084] In conjunction with the present invention, plant cells according to the invention and plants according to the invention can also be manufactured by the use of so-called insertion mutagenesis (overview article: Thorneycroft et al., 2001, Journal of experimental Botany 52 (361), 1593-1601). In conjunction with the present invention, insertion mutagenesis is to be understood to mean particularly the insertion of transposons or so-called transfer DNA (T-DNA) into a gene or in the vicinity of a gene coding for a Class 3 branching enzyme, whereby as a result of which the activity of a Class 3 branching enzyme in the cell concerned is increased.

[0085] The transposons can be both those that occur naturally in the cell (endogenous transposons) and also those that do not occur naturally in said cell but are introduced into the cell (heterologous transposons) by means of genetic engineering methods, such as transformation of the cell, for example. Changing the expression of genes by means of transposons is known to the person skilled in the art. An overview of the use of endogenous and heterologous transposons as tools in plant biotechnology is presented in Ramachandran and Sundaresan (2001, Plant Physiology and Biochemistry 39, 234-252).

[0086] T-DNA insertion mutagenesis is based on the fact that certain sections (T-DNA) of Ti plasmids from *Agrobacterium* can integrate into the genome of vegetable cells. The place of integration in the vegetable chromosome is not defined, but can take place at any point. If the T-DNA integrates into a part of the chromosome or in the vicinity of a part of the chromosome, which constitutes a gene function, then this can lead to an increase in the gene expression and thus also to a change in the activity of a protein coded by the gene concerned. Here, the sequences inserted into the genome (in particular transposons or T-DNA) are distinguished by the fact that they contain sequences, which lead to an activation of regulatory sequences of a Class 3 branching enzyme gene ("activation tagging").

[0087] Plant cells and plants according to the invention can be produced by means of the so-called "activation tagging" method (see, for example, Walden et al., Plant J. (1991), 281-288; Walden et al., Plant Mol. Biol. 26 (1994), 1521-1528). These methods are based on activating endogenous promoters by means of "enhancer" sequences, such as the enhancer of the 35S RNA promoter of the cauliflower mosaic virus, or the octopine synthase enhancer.

[0088] In conjunction with the present invention, the term "T-DNA activation tagging" is to be understood to mean a T-DNA fragment, which contains "enhancer" sequences and which leads to an increase in the activity of at least one Class 3 branching enzyme by integration into the genome of a plant cell.

[0089] In conjunction with the present invention, the term "transposon activation tagging" is to be understood to mean a transposon, which contains "enhancer" sequences and which leads to an increase in the activity of at least one Class 3 branching enzyme by integration into the genome of a plant cell.

[0090] In a preferred embodiment, the DNA molecules according to the invention, which code a Class 3 branching enzyme, are linked with regulatory sequences, which guarantee transcription in vegetable cells and lead to an increase in Class 3 branching enzyme activity in the cell. In this case, the nucleic acid molecules according to the invention are present in "sense" orientation to the regulatory sequences.

[0091] For expressing nucleic acid molecules according to the invention, which code Class 3 branching enzymes, these are preferably linked with regulatory DNA sequences, which guarantee transcription in vegetable cells. In particular, these include promoters. In general, any promoter that is active in vegetable cells is eligible for expression. At the same time, the promoter can be chosen so that expression takes place constitutively or only in a certain tissue, at a certain stage of the plant development or at a time determined by external influences. The promoter can be homologous or heterologous both with respect to the plant and with respect to the nucleic acid molecule.

[0092] Suitable promoters are, for example, the promoter of the 35S RNA of the cauliflower mosaic virus and the ubiquitin promoter from maize for constitutive expression, the patatin promoter B33 (Rocha-Sosa et al., EMBO J. 8 (1989), 23-29) for tuber-specific expression in potatoes or a promoter, which only ensures expression in photosynthetically active tissues, e.g. the ST-LS1 promoter (Stockhaus et al., Proc. Natl. Acad. Sci. USA 84 (1987), 7943-7947;

Stockhaus et al., EMBO J. 8 (1989), 2445-2451) or, for endosperm-specific expression of the HMG promoter from wheat, the USP promoter, the phaseolin promoter, promoters of zein genes from maize (Pedersen et al., Cell 29 (1982), 1015-1026; Quatroccio et al., Plant Mol. Biol. 15 (1990), 81-93), glutelin promoter (Leisy et al., Plant Mol. Biol. 14 (1990), 41-50; Zheng et al., Plant J. 4 (1993), 357-366; Yoshihara et al., FEBS Lett. 383 (1996), 213-218) or shrunken-1 promoter (Werr et al., EMBO J. 4 (1985), 1373-1380). However, promoters can also be used, which are only activated at a time determined by external influences (see for example WO 9307279). Promoters of heat-shock proteins, which allow simple induction, can be of particular interest here. Furthermore, seed-specific promoters can be used, such as the USP promoter from *Vicia faba*, which guarantees seed-specific expression in *Vicia faba* and other plants (Fiedler et al., Plant Mol. Biol. 22 (1993), 669-679; Bäumlein et al., Mol. Gen. Genet. 225 (1991), 459-467).

[0093] Furthermore, a termination sequence (polyadenylation signal) can be present, which is used for adding a poly-A tail to the transcript. A function in the stabilisation of the transcripts is ascribed to the poly-A tail. Elements of this type are described in the literature (cf. Gielen et al., EMBO J. 8 (1989), 23-29) and can be exchanged at will.

[0094] Furthermore, plant cells according to the invention and plants according to the invention can be manufactured by means of so-called "in situ activation". In this case, the introduced genetic modification effects a change in the regulatory sequences of endogenous Class 3 branching enzyme genes, which leads to an increased expression of Class 3 branching enzyme genes. Preferably, the activation of a Class 3 branching enzyme gene takes place by "in vivo" mutagenesis of a promoter or of "enhancer" sequences of an endogenous Class 3 branching enzyme gene. In doing so, a promoter or an "enhancer" sequence, for example, can be changed in such a way that the mutation produced leads to an increased expression of a Class 3 branching enzyme gene in plant cells according to the invention or plants according to the invention in comparison with the expression of a Class 3 branching enzyme gene in wild type plant cells or wild type plants. The mutation in a promoter or an "enhancer" sequence can also lead to Class 3 branching enzyme genes in plant cells according to the invention or plants according to the invention being expressed at a time at which they would not be expressed in wild type plant cells or wild type plants.

[0095] In so-called "in vivo mutagenesis", a hybrid RNA-DNA oligonucleotide ("Chimeroplast") is introduced into plant cells (Kipp, P.B. et al., Poster Session at the "5th International Congress of Plant Molecular Biology, 21st-27th September 1997, Singapore; R. A. Dixon and C.J. Arntzen, meeting report on "Metabolic Engineering in Transgenic Plants", Keystone Symposia, Copper Mountain, CO, USA, TIBTECH 15, (1997), 441-447; international patent application WO 9515972; Kren et al., Hepatology 25, (1997), 1462-1468; Cole-Strauss et al., Science 273, (1996), 1386-1389; Beetham et al., 1999, PNAS 96, 8774-8778).

[0096] A part of the DNA components of the RNA-DNA oligonucleotide is homologous to a nucleic acid sequence of an endogenous Class 3 branching enzyme gene, but, in comparison with the nucleic acid sequence of a Class 3 branching enzyme gene, it has a mutation or contains a heterologous region, which is surrounded by the homologous regions.

[0097] By base pairing of the homologous regions of the RNA-DNA oligonucleotide and the endogenous nucleic acid molecule followed by homologous recombination, the mutation or heterologous region contained in the DNA components of the RNA-DNA oligonucleotide can be transferred into the genome of a plant cell. This leads to an increase in the activity of one or more Class 3 branching enzymes.

[0098] All these methods are based on the introduction of a foreign nucleic acid molecule into the genome of a plant cell or plant and are therefore basically suitable for the manufacture of plant cells according to the invention and plants according to the invention.

[0099] Surprisingly, it has been found that plant cells according to the invention and plants according to the invention synthesise a modified starch in comparison with starch of corresponding wild type plant cells or wild type plants that have not been genetically modified.

[00100] The plant cells according to the invention and plants according to the invention synthesise a modified starch, which in its physical-chemical characteristics, in particular the amylose content or the amylose/amylopectin ratio, the degree of branching, the average chain

length, the side chain distribution, the viscosity behaviour, the gelling strength, the starch grain size and/or the starch grain morphology, is changed in comparison with the synthesised starch in wild type plant cells or wild type plants, so that this is better suited for special applications.

[00101] The present invention therefore also includes plant cells according to the invention and plants according to the invention, which synthesise a modified starch.

[00102] In conjunction with the present invention, the term "modified starch" means that the starch has changed physical-chemical characteristics compared with non-modified starch obtainable from corresponding wild type plant cells or wild type plants.

[00103] In a preferred embodiment of the present invention, the modified starch is native starch.

[00104] In conjunction with the present invention, the term "native starch" means that the starch is isolated from plants according to the invention, harvestable plant plants according to the invention or propagation material of plants according to the invention by methods known to the person skilled in the art.

[00105] Furthermore, genetically modified plants, which contain the plant cells according to the invention, are also the subject matter of the invention. Plants of this type can be produced from plant cells according to the invention by regeneration.

[00106] In principle, the plants according to the invention can be plants of any plant species, i.e. both monocotyledonous and dicotyledonous plants. Preferably they are useful plants, i.e. plants, which are cultivated by people for the purposes of food or for technical, in particular industrial purposes.

[00107] In a further preferred embodiment, the plant according to the invention is a starch-storing plant.

[00108] In a further preferred embodiment, the present invention relates to starch-storing

plants according to the invention of the genus *Solanum*, in particular *Solanum tuberosum*.

[00109] The term "starch-storing plants" includes all plants with starch-storing plant parts such as, for example, maize, rice, wheat, rye, oat, barley, cassava, potato, sago, mung bean, pea or sorghum. Preferred starch-storing plant parts are, for example, tubers, storage roots and grains containing an endosperm; tubers are particularly preferred; tubers of potato plants are especially preferred.

[00110] In conjunction with the present invention, the term "potato plant" or "potato" means plant species of the genus *Solanum*, in particular tuber-producing species of the genus *Solanum* and especially *Solanum tuberosum*.

[00111] The present invention also relates to propagation material of plants according to the invention containing a plant cell according to the invention.

[00112] Here, the term "propagation material" includes those constituents of the plant that are suitable for producing offspring by vegetative or sexual means. Cuttings, callus cultures, rhizomes or tubers, for example, are suitable for vegetative propagation. Other propagation material includes, for example, fruits, seeds, seedlings, protoplasts, cell cultures, etc. Preferably, the propagation material is seeds and particularly preferably tubers.

[00113] In a further embodiment, the present invention relates to harvestable plant parts of plants according to the invention such as fruits, storage roots, roots, blooms, buds, shoots or stems, preferably seeds or tubers, wherein these harvestable parts contain plant cells according to the invention.

[00114] Furthermore, the present invention also relates to a method for the manufacture of a genetically modified plant according to the invention, wherein

a) a plant cell is genetically modified, whereby the genetic modification leads to an increase in the activity of a Class 3 vegetable branching enzyme in comparison with corresponding wild type plant cells that have not been genetically modified;

b) a plant is regenerated from plant cells from Step a); and

c) if necessary, further plants are produced with the help of the plants according to Step b).

[00115] The genetic modification introduced into the plant cell according to Step a) can basically be any type of modification, which leads to the reduction [sic?] of the activity of a Class 3 branching enzyme. The regeneration of the plants according to Step (b) can be carried out using methods known to the person skilled in the art (e.g. described in "Plant Cell Culture Protocols", 1999, edt. by R.D. Hall, Humana Press, ISBN 0-89603-549-2).

[00116] The production of further plants according to Step (c) of the method according to the invention can be carried out, for example, by vegetative propagation (for example using cuttings, tubers or by means of callus culture and regeneration of whole plants) or by sexual propagation. Here, sexual propagation preferably takes place under controlled conditions, i.e. selected plants with particular characteristics are crossed and propagated with one another.

[00117] In a preferred embodiment of the method according to the invention, the genetic modification consists in the introduction of a foreign nucleic acid molecule into the genome of the plant cell, wherein the presence or the expression of said foreign nucleic acid molecule leads to an increased activity of a Class 3 branching enzyme in the cell.

[00118] In a further preferred embodiment, the method according to the invention is used for producing potato plants according to the invention.

[00119] In a further preferred embodiment of the method according to the invention, the foreign nucleic acid molecule is chosen from the group consisting of

a) Nucleic acid molecules, which code a protein with the amino acid sequence given under Seq ID NO 4;

b) Nucleic acid molecules, which code a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence given under SEQ ID NO: 4;

c) Nucleic acid molecules, which include the nucleotide sequence shown under Seq ID

NO 3 or a complimentary sequence;

d) Nucleic acid molecules, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);

e) Nucleic acid molecules, which hybridise with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;

f) Nucleic acid molecules, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; and

g) Nucleic acid molecules, which represent fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).

[00120] In a further preferred embodiment of the method according to the invention, the foreign nucleic acid molecule is chosen from the group consisting of

a) T-DNA molecules, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (T-DNA activation tagging);

b) DNA molecules, which contain transposons, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (transposon activation tagging);

c) DNA molecules, which code a Class 3 branching enzyme and which are linked with regulatory sequences, which guarantee transcription in vegetable cells and lead to an increase in Class 3 branching enzyme activity in the cell;

d) Nucleic acid molecules introduced by means of in vivo mutagenesis, which lead to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects an increase in the expression of a gene coding a Class 3 branching enzyme.

[00121] The present invention also relates to the plants obtained by the method according to the invention.

[00122] In a further embodiment of the method according to the invention, the plants according to the invention synthesise a modified starch in comparison with corresponding wild

type plants that have not been genetically modified.

[00123] Surprisingly, it has been found that plant cells and plants, which have an increased activity of a Class 3 branching enzyme, synthesise a modified starch.

[00124] The present invention also relates to the plants obtained by the method according to the invention.

[00125] The present invention also relates to modified starches obtainable from plant cells according to the invention or plants according to the invention, from propagation material according to the invention or from harvestable plant parts according to the invention.

[00126] In a particularly preferred embodiment, the present invention relates to modified potato starch.

[00127] Furthermore the present invention relates to a method for the manufacture of a modified starch including the step of extracting the starch from a plant cell according to the invention or from a plant according to the invention, from propagation material according to the invention of such a plant and/or from harvestable plant parts according to the invention of such a plant, preferably from starch-storing parts according to the invention of a plant. Preferably, such a method also includes the step of harvesting the cultivated plants or plant parts and/or the propagation material of these plants before the extraction of the starch and, further, particularly preferably the step of cultivating plants according to the invention before harvesting.

[00128] Methods for extracting starches from plants or from starch-storing parts of plants are known to the person skilled in the art. Furthermore, methods for extracting starch from different starch-storing plants are described, e.g. in Starch: Chemistry and Technology (Publisher: Whistler, BeMiller and Paschall (1994), 2nd Edition, Academic Press Inc. London Ltd; ISBN 0-12-746270-8; see e.g. Chapter XII, Page 412-468: Maize and Sorghum Starches: Manufacture; by Watson; Chapter XIII, Page 469-479: Tapioca, Arrowroot and Sago Starches: Manufacture; by Corbishley and Miller; Chapter XIV, Page 479-490: Potato starch: Manufacture and Uses; by Mitch; Chapter XV, Page 491 to 506: Wheat starch: Manufacture, Modification and Uses; by

Knight and Oson; and Chapter XVI, Page 507 to 528: Rice starch: Manufacture and Uses; by Rohmer and Klem; Maize starch: Eckhoff et al., Cereal Chem. 73 (1996), 54-57, the extraction of maize starch on an industrial scale is generally achieved by so-called "wet milling".). Devices, which are in common use in methods for extracting starch from plant material are separators, decanters, hydrocyclones, spray dryers and fluid bed dryers.

[00129] In conjunction with the present invention, the term "starch-storing parts" is to be understood to mean such parts of a plant in which, in contrast to transitory leaf starch, starch is stored as a deposit for surviving for longer periods. Preferred starch-storing parts are tubers, storage roots, seeds or endosperm; particularly preferred are potato tubers or the endospermo of maize, wheat or rice plants.

[00130] Modified starch obtainable by a method according to the invention for manufacturing modified starch is also the subject matter of the present invention.

[00131] Furthermore, the use of plant cells according to the invention or plants according to the invention for manufacturing a modified starch are the subject matter of the present invention.

[00132] The person skilled in the art knows that the characteristics of starch can be changed by thermal, chemical, enzymatic or mechanical derivation, for example. Derived starches are particularly suitable for different applications in the foodstuffs and/or non-foodstuffs sector. The starches according to the invention are better suited as a starting substance for the manufacture of derived starches than conventional starches.

[00133] The present invention therefore also relates to the manufacture of a derived starch, wherein modified starch according to the invention is derived retrospectively.

[00134] In conjunction with the present invention, the term "derived starch" is to be understood to mean a modified starch according to the invention, the characteristics of which have been changed after isolation from vegetable cells with the help of chemical, enzymatic, thermal or mechanical methods. In a preferred embodiment of the present invention, the derived

starch according to the invention is starch that has been heat-treated and/or acid-treated. In a further preferred embodiment, the derived starches are starch ethers, in particular starch alkyl ethers, O-allyl ethers, hydroxylalkyl ethers, O-carboxylmethyl ethers, nitrogen-containing starch ethers, phosphate-containing starch ethers or sulphur-containing starch ethers. In a further preferred embodiment, the derived starches are cross-linked starches. In a further preferred embodiment, the derived starches are starch graft polymers. In a further preferred embodiment, the derived starches are oxidised starches. In a further preferred embodiment, the derived starches are starch esters, in particular starch esters, which have been introduced into the starch using organic acids. Particularly preferably these are phosphate, nitrate, sulphate, xanthate, acetate or citrate starches.

[00135] The derived starches according to the invention are suitable for different applications in the foodstuffs and/or non-foodstuffs sector. Methods for manufacturing derived starches according to the invention are known to the person skilled in the art and are adequately described in the general literature. An overview on the manufacture of derived starches can be found, for example, in Orthoefer (in Corn, Chemistry and Technology, 1987, eds. Watson und Ramstad, Chapter 16, 479-499).

[00136] Derived starch obtainable by the method according to the invention for manufacturing a derived starch is also the subject matter of the present invention.

[00137] Furthermore, the use of modified starches according to the invention for manufacturing derived starch is the subject matter of the present invention.

Description of sequences

[00138] SEQ ID NO 1: Nucleic acid sequence containing the coding region of the 3′-area of a Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence is inserted in plasmid AN 46-196.

[00139] SEQ ID NO 2: Nucleic acid sequence containing the coding region of the 5′-area of a

Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence is inserted in plasmid AN 47-196.

[00140] SEQ ID NO 3: Nucleic acid sequence containing the full coding region of a Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence is inserted in plasmid AN 49 and was deposited with the Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Mascheroder Weg 1b, 38124 Braunschweig, Germany, in accordance with the Budapest Treaty on 15th September 2003 under the number DSM 15926.

[00141] SEQ ID NO 4: Amino acid sequence coding a Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence can be derived from the nucleic acid sequence inserted in plasmid AN 49 or from the nucleic acid sequence described under SEQ ID NO 3.

[00142] SEQ ID NO 5: Nucleic acid sequence containing the full coding region of a Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence has been obtained by combining the nucleic acid sequences described under SEQ ID NO 1 and SEQ ID NO 2. This nucleic acid sequence constitutes an allelic variant of the nucleic acid sequence described under SEQ ID NO 3 coding a Class 3 branching enzyme.

[00143] SEQ ID NO 6: Amino acid sequence coding a Class 3 branching enzyme from *Solanum tuberosum* (cv Désirée). This sequence can be derived from the nucleic acid sequence described under SEQ ID NO 5 and constitutes an allelic variant of the amino acid sequence described under SEQ ID NO 4 coding a Class 3 branching enzyme.

Description of the figures

[00144] Fig. 1 shows the relative amount of mRNA in seeds of genetically modified rice plants (GOAS0453), expressing a potato branching enzyme Class 3. Also shoen is the example of a genetically non modified wild type plant (wt).

General methods

[00145] The following methods were used in the examples:

1. Demonstration of the activity of a Class 3 branching enzyme

[00146] The activity of a Class 3 branching enzyme was demonstrated with the help of non-denaturing gel electrophoresis as follows:

[00147] To isolate proteins from plants, the test material was ground with a pestle in liquid nitrogen, absorbed into an extraction buffer (50 mM Na citrate, pH 6.5; 1 mM EDTA, 4 mM DTT) and, after centrifugation (10 min, 14.000 g, 4 °C), was used directly for measurement of the protein content according to Bradford. Subsequently, 5μg to 20 μg total protein extract was mixed with 4X loading buffer (20% glycerol, 125 mM Tris HCl, pH 6.8) and loaded onto a BE activity gel. The BE activity gel was made up as follows: 2.5 ml 30% acrylamide:0.8% bisacrylamide, 0.1 ml running buffer, 7.4 ml H_2O, 10% ammonium persulphate solution and 5 μl N,N,N',N'- tetramethylethylenediamine (TEMED). The running buffer (RB) was made up as follows: RB = 30.2 g Tris base, pH 8.0, 144 g glycine on 1 L H_2O. On completion of the gel run, each of the gels was incubated overnight at 37 °C in 25 ml "phosphorylase buffer" (25 ml 1M Na citrate pH 7.0, 0.47 g glucose-1-phosphate, 12.5 mg AMP, 2.5 mg phosphorylase a/b from "rabbit"). The gels were coloured with Lugol's solution.

2. Transformation of *Oryza sativa* (cv. M202)

[00148] Rice plants were transformed in accordance with the methods described by Hiei et al. (1994, Plant Journal 6(2), 271-282).

3. Starch analysis

a) Determination of the amylose content and of the amylose/amylopectin ratio

[00149] Rice flour was obtained from polished rice by milling the grains in a Cyclotec labmill to particle size smaller than 0,5 mm.

[00150] Amylose content was determined by the method of Juliano.(1971)(Cereal Science Today, 16, p334-340) with slight modifications. 50mg of rice flour are weighed in a 100ml

Erlenmeyer flask and wetted with 1 ml of 95% ethanol to avoid lumping. After addition of 9 ml of 1 M NaOH the sample is heated to 100°C for 20 min, cooled to room temperature and filled up to 100 ml with destilled water.

[00151] An aliquot of 100 μl is mixed with 10μl 1M acetic acid, 20μl Lugol solution (0,2% I_2 and 2% KI) and 970 μl water. After 10 minutes the OD at 620 nm is determined. The amylose content is calculated from a standard curve generated from samples with defined amount of potato amylose.

b) Determination of the phosphate content

[00152] In starch, the positions C2, C3 and C6 of the glucose units can be phosphorylated. Determination of C6-P content of rice starch is performed either on single mature grains hydrolysed in 200 μl of 0,7 M HCl or on 50 mg rice flour hydroylsed in 500 μl 0,7 M HCl.
After 4 h hydrolysis at 95°C under continuous shaking, samples are centrifuged for 10 minutes at 15500xg and the supernatants are applied to a spin module containing 0,2 μm PTFE-filter membran for complete clarification of the hydrolyzate (5 min 1000xg). 20 μl of the supernatants are mixed with 180 μl of imidazole buffer (300 mM imidazole, pH 7.2; 7,5 mM $MgCl_2$, 1 mM EDTA and 0.4 mM NADP). The measurement was carried out in a photometer at 340 nm. After the base absorption had been established, the enzyme reaction was started by addition of 0,4 units glucose-6-phosphate dehydrogenase (from Leuconostoc mesenteroides, Boehringer Mannheim). The change in absorption is directly proportional to the concentration of the G-6-P content of the starch.

[00153] The total phosphate content was determined by the method of Ames (Methods in Enzymology VIII, (1966), 115-118).

[00154] Approximately 50 mg of starch are treated with 30 μl of ethanolic magnesium nitrate solution and ashed for 3 hours at 500°C in a muffle oven. The residue is treated with 300 μl of 0.5 M hydrochloric acid and incubated for 30 minutes at 60°C. One aliquot is subsequently made up to 300 μl 0.5 M hydrochloric acid and this is added to a mixture of 100 μl of 10% ascorbic acid and 600 μl of 0.42% ammonium molybdate in 2 M sulphuric acid and incubated for 20 minutes at

45°C.

[00155] This is followed by a photometric determination at 820 nm with a phosphate calibration series as standard.

c) Determination of the viscosity characteristics by means of a Rapid Visco Analyser (RVA)

[00156] 3 g of rice flour (DM) are taken up in 25 ml of H_2O (VE-type water, conductivity of at least 15 mega ohm) and used for the analysis in a Rapid Visco Analyser Super3 (Newport Scientific Pty Ltd., Investmet Support Group, Warriewod NSW 2102, Australia). The apparatus is operated following the manufacturer's instructions. The viscosity values are indicated in Centipoise (cP) in accordance with the manufacturer's operating manual, which is incorporated into the description herewith by reference. To determine the viscosity of the aqueous starch solution, the starch suspension is first stirred for 10 seconds at 960 rpm and subsequently heated at 50°C at a stirring speed of 160 rpm, initially for a minute (step 1). The temperature was then raised from 50°C to 95°C at a heating rate of 12°C per minute (step 2). The temperature is held for 2.5 minutes at 95°C (step 3) and then cooled from 95°C to 50°C at 12°C per minute (step 4). In the last step (step 5), the temperature of 50°C is held for 2 minutes. The viscosity is determined during the entire duration.

[00157] After the program has ended, the stirrer is removed and the beaker covered. The gelatinized starch is now available for the texture analysis after 24 hours incubation at room temperature.

[00158] The profile of the RVA analysis contains parameters which are shown for the comparison of different measurements and substances. In the context of the present invention, the following terms are to be understood as follows:

1. Maximum viscosity (RVA Max)

[00159] The maximum viscosity is understood as meaning the highest viscosity value, measured in cP, obtained in step 2 or 3 of the temperature profile.

2. Minimum viscosity (RVA Min)

[00160] The minimum viscosity is understood as meaning the lowest viscosity value, measured in cP, observed in the temperature profile after the maximum viscosity. Normally, this takes place in step 3 of the temperature profile.

3. Final viscosity (RVA Fin)

[00161] The final viscosity is understood as meaning the viscosity value, measured in cP, observed at the end of the measurement.

4. Setback (RVA Set)

[00162] What is known as the "setback" is calculated by subtracting the value of the final viscosity from that of the minimum occurring after the maximum viscosity in the curve.

5. Gelatinization temperature (RVA PT)

[00163] The gelatinization temperature is understood as meaning the point in time of the temperature profile where, for the first time, the viscosity increases drastically for a brief period.

d) Determination of the gel strength (Texture Analyser)

[00164] 3 g of rice flour (DM) are gelatinized in the RVA apparatus in 25 ml of an aqueous suspension (temperature program: see item c) "Determination of the viscosity characteristics by means of a Rapid Visco Analyser (RVA)") and subsequently stored for 24 hours at room temperature in a sealed container. The samples are fixed under the probe (round piston with planar surface) of a Texture Analyser TA-XT2 from Stable Micro Systems (Surrey, UK) and the gel strength was determined using the following parameters:

- Test speed 0.5 mm/s
- Depth of penetration 7 mm
- Contact surface 113 mm^2
- Pressure 2 g

e) Analysis of the side-chain distribution of the amylopectin by means of ion-exchange chromatography

[00165] To separate amylose and amylopectin, 200 mg of starch are dissolved in 50 ml reaction vessels, using 12 ml of 90% (v/v) DMSO in H_2O. After addition of 3 volumes of ethanol, the precipitate is separated by centrifugation for 10 minutes at about 1800xg at room temperature (RT). The pellet is then washed with 30 ml of ethanol, dried and dissolved in 40 ml of 1% (w/v) NaCl solution at 75°C. After the solution has cooled to 30°C, approximately 90 mg of thymol are added slowly, and this solution is incubated for at least 60 h at 30°C. The solution is then centrifuged for 30 minutes at 2000xg (RT). The supernatant is then treated with 3 volumes of ethanol, and the amylopectin which settles out is separated by centrifugation for 5 minutes at 2000xg (RT). The pellet (amylopectin) is then washed with ethanol and dried using acetone. By addition of DMSO to the pellet, one obtains a 1% solution, of which 200 μl are treated with 345 μl of water, 10 μl of 0.5 M sodium acetate (pH 3.5) and 5 μl of isoamylase (dilution 1:10; Megazyme) and incubated for about 16 hours at 37°C. A 1:5 aqueous dilution of this digest is subsequently filtered through a 0.2 μm filter, and 100 μl of the filtrate are analysed by ion exchange chromatography (HPAEC-PAD, Dionex). Separation was performed using a PA-100 column (with suitable precolumn), while detection was performed amperometrically. The elution conditions were as follows:

[00166] Solution A - 0.15M NaOH

[00167] Solution B – 1 M sodium acetate in 0.15M NaOH

t (min)	Solution A (%)	Solution B (%)
5	0	100
35	30	70
45	32	68
60	100	0
70	100	0
72	0	100
80	0	100
Stop		

Table 1: Composition of the elution buffer for the side chain analysis of the amylopectin at different times during the HPEAC-PAD Dionex analysis. Between the times stated, the

composition of the elution buffer changes in each case linearly.

[00168] The determination of the relative amount of short side chains in the total of all side chains is carried out via the determination of the percentage of a particular side chain in the total of all side chains. The total of all side chains is determined via the determination of the total area under the peaks which represent the polymerization degrees of DP 6 to 34 in the HPCL chromatogram.

[00169] The percentage of a particular side chain in the total of all side chains is determined via the determination of the ratio of the area under the peak which represents this side chain in the HPLC chromatogram to the total area. The programme Chromelion 6.20 Version 6.20 from Dionex, USA, was used for determining the peak areas.

f) Determination of the activity of the BEIII protein

[00170] This was carried out as specified in the example.

g) DSC-analysis („Differential Scanning Calorimetry")

[00171] Investigations with the aid of DSC-analysis have been done by the method described by WO 01/19975. 10 mg starch treated with 30 µl H_20 (VE-type water, conductivity of at least 15 mega ohm) were sealed in stainless steal pans (volume 50 µl). The pan is heated from 20°C to 150°C at a rate of 10°C per minute in a Diamond DSC-instrument (Perkin Elmer). The programme Pyres from Perkin Elmer was used for determining the data.

Examples

Example 1

Cloning of a full-length sequence coding a Class 3 branching enzyme from Solanum tuberosum

[00172] The gene sequence coding for this Class 3 branching enzyme in *Solanum tuberosum* has not previously been described .

[00173] By sequence comparisons with different branching enzymes, a domain was identified, with the help of which EST databases were examined. In doing so, the EST TC73137 (TIGR

database; http://www.tigr.org/tigr-scripts/tgi/tc_report.pl?tc=TC73137&species=potato) from potato was identified.

[00174] With the help of the primers B1_Asp (GAT GGG TAC CAG CAC TTC TAC TTG GCA GAG G) and B2_Sal (TCA AGT CGA CCA CAA CCA GTC CAT TTC TGG), a sequence from a tuber-specific cDNA bank from S*olanum tuberosum* (cv. Désirée) corresponding to this EST sequence was amplified. Attempts to use leaf-specific, "sink"-tissue-specific or "source"-tissue-specific cDNA banks as a template for the PCR reaction led to no amplification.

[00175] In order to amplify the whole coding sequence of the branching enzyme concerned, which up to now had also included unknown sequences, primers were manufactured, which were complimentary to the ends of the previously known sequence and vector sequences of the cDNA banks concerned. With all the primer combinations for the amplification of a full-length sequence of a Class 3 branching enzyme used in this approach, it was not possible to amplify any further area. Hereupon, EST databases of tomato were examined again.

[00176] In this case, two ESTs from tomato were identified (TIGR database; BG127920 and TC130382), which either had a high homology to the amplification of the Class 3 branching enzyme from potato described above (TC130382) and (BG127920) respectively, or to the putative branching enzyme gene from arabidopsis (GenBank: GP|9294564|dbj|BAB02827.1).

[00177] Primers were now manufactured again in order to also amplify previously unknown sequences of the Class 3 branching enzyme. By means of PCR, the 3'-area of the Class 3 branching enzyme was amplified from a cDNA bank, made from tubers of *Solanum tuberosum* (cv. Désirée), with the primers KM2_Spe (5'-TCAAACTAGTCACAACCAGTCCATTTCTGG-3') and So_putE (5'-CACTTTAGAAGGTATCAGAGC-3'). The fragment with a size of ca. 1 kb that was obtained was cloned undirectedly in the pCR4-TOPO vector from Invitrogen (product number: 45-0030). The plasmid produced was designated as AN 46-196. The sequence of the inserted fragments in the plasmid AN 46-196 is shown under SEQ ID NO 1.

[00178] The 5'-area was likewise amplified by means of PCR technology and using the

primers So_put5' (5'-GTATTTCTGCGAAGGAACGACC-3') and So_putA (5'-AACAATGCTCTCTCTGTCGG-3') from the same cDNA bank. The fragment with a size of ca. 2 kb that was obtained was cloned undirectedly in the pCR4-TOPO vector from Invitrogen (product number: 45-0030). The plasmid produced was designated as AN 47-196. The sequence of the inserted fragments in the plasmid AN 47-196 is shown under SEQ ID NO 2.

[00179] Primers were now manufactured again in order to amplify a full-length sequence.

[00180] The following primers were used: SO_putA (AACAATGCTCTCTCTGTCGG) and SO_putE (CACTTTAGAAGGTATCAGAGC). A PCR product with an approximate size of 3.2 kb was obtained and was cloned in the pCR2.1 vector from Invitrogen (product number: 45-0030). The plasmid obtained (filed under DSM 15926) was designated as AN 49. The sequence of the inserted fragments in the plasmid AN 49 is shown under SEQ ID NO 3.

Example 2
Information on vectors and plasmids

Manufacture of the expression vector ME5/6

[00181] pGSV71 is a derivative of the plasmid pGSV7, which derives from the intermediate vector pGSV1. pGSV1 constitutes a derivative of pGSC1700, the construction of which has been described by Cornelissen and Vanderwiele (Nucleic Acid Research 17, (1989), 19-25). pGSV1 was obtained from pGSC1700 by deletion of the carbenicillin resistance gene and deletion of the T-DNA sequences of the TL-DNA region of the plasmid pTiB6S3.

[00182] pGSV7 contains the replication origin of the plasmid pBR322 (Bolivar et al., Gene 2, (1977), 95-113) as well as the replication origin of the *Pseudomonas* plasmid pVS1 (Itoh et al., Plasmid 11, (1984), 206). pGSV7 also contains the selectable marker gene *aadA*, from the transposon Tn1331 from *Klebsiella pneumoniae*, which gives resistance against the antibiotics spectinomycin and streptomycin (Tolmasky, Plasmid 24 (3), (1990), 218-226; Tolmasky and Crosa, Plasmid 29(1), (1993), 31-40).

[00183] The plasmid pGSV71 was obtained by cloning a chimeric *bar* gene between the

border regions of pGSV7. The chimeric *bar* gene contains the promoter sequence of the cauliflower mosaic virus for initiating the transcription (Odell et al., Nature 313, (1985), 180), the *bar* gene from *Streptomyces hygroscopicus* (Thompson et al., Embo J. 6, (1987), 2519-2523) and the 3'-untranslated area of the nopaline synthase gene of the T-DNA of pTiT37 for terminating the transcription and polyadenylation. The *bar* gene provides tolerance against the herbicide glufosinate ammonium.

[00184] At position 198-222, the T-DNA is given the right edge sequence of the TL-DNA from the plasmid pTiB6S3 (Gielen et al., EMBO J. 3, (1984), 835-846). A polylinker sequence is located between nucleotide 223-249. The nucleotides 250-1634 contain the P35S3 promoter region of the cauliflower mosaic virus (Odell et al., see above). The coding sequence of the phosphinothricin resistance gene (*bar*) from *Streptomyces hygroscopicus* (Thompson et al. 1987, see above) is contained between the nucleotides 1635-2186. At the same time, the two end codons at the 5'-end of the *bar* wild type gene were replaced by the codons ATG and GAC. A polylinker sequence is located between the nucleotides 2187-2205. The 260-bp-long *Taq*I fragment of the untranslated 3'-end of the nopaline synthase gene (3'nos) from the T-DNA of the plasmid pTiT37 (Depicker et al., J. Mol. Appl. Genet. 1, (1982), 561-573) is located between the nucleotides 2206 and 2465. The nucleotides 2466-2519 contain a polylinker sequence. The left edge sequence of the TL-DNA from pTiB6S3 (Gielen et al., EMBO J. 3, (1984), 835-846) is located between the nucleotides 2520-2544.

[00185] The sector pGSV71 was then cut and smoothed with the enzyme *Pst*I. The B33 promoter and the *ocs* cassette were cut from the vector pB33-Kan as an *Eco*RI-*Hind*III fragment and smoothed and inserted in the vector pGSV71, which had been cut and smoothed with *Pst*I. The vector obtained was used as the starting vector for the construction of ME5/6. An oligonucleotide containing the sites *Eco*RI, *Pac*I, *Spe*I, *Srf*I, *Spe*I, *Not*I, *Pac*I and *Eco*RI was introduced into the *Pst*I site situated between the B33 promoter and *ocs* element while doubling the *Pst*I site. The expression vector obtained was designated as ME5/6.

Manufacture of the expression vector IL103-123

[00186] In the further course of events, a *BamH*I fragment of ME5-6 was replaced by a PCR

product that had been extended by a few sites but was otherwise identical, resulting in the plasmid UL1-17. The B33 promoter contained in UL1-17 was cut out with the restriction enzymes *Hind*III and *Pst*I and the vector relegated after smoothing the ends, producing the vector ML18-56. This vector was opened with *Mun*I and *Pst*I and an MCS synthesised by means of two oligonuclotides with appropriately sticky ends was added. The resulting plasmid ML72-123 was opened with the restriction enzymes *Hpa*I and *Mun*I and oligonucleotides for detection sequences of further restriction enzymes introduced (IR96-123). Subsequently, an *Ecl136*II/*Eco*RV PCR product for the globulin promoter for rice was spliced into the *Eco*RV site of IR96-123, as a result of which the base vector for an endosperm-specific expression of genes of different origin was produced. The vector is designated in the following as IR103-123.

Manufacture of the plasmid AH33-191

[00187] The manufacture of the plasmid AH33-191 for an endosperm-specific expression of a potential Class 3 branching enzyme from potato in rice was carried out by splicing an *Eco*RV/*Sac*I fragment of the appropriate cDNA from the plasmid AN49 into the appropriate sites of IR103-123.

Example 3

Genetically modified plants with increased Class 3 branching enzyme activity

[00188] In order to produce transgenic rice plants, which have an increased expression of a Class 3 branching enzyme gene, the T-DNA of the plasmid AH33-191 was transferred into rice plants (M202) with the help of agrobacteria, as described above under General Methods. Plants obtained by the transformation with the plasmid AH33-191 were designated GAOS0453.

[00189] Analysis of the transgenic rice plants obtained, with the help of non-denaturising gel electrophoresis of protein extracts from grains of wild type plant cells and/or protein extracts from genetically modified plants, showed that the grains of genetically modified plant cells have an increased activity of a Class 3 branching enzyme in comparison with protein extracts from grains of wild type plant cells.

[00190] In addition the expression level of potato branching enzyme Class 3 in transgenic rice

plants was also evaluated by analysis of the amount of mRNA by means of quantitative PCR (Q-PCR).

[00191] RNA was extracted from single immature seeds (10 to 12 days after pollination). Immature seeds were frozen in liquid nitrogen and homogenized in a ball mill (MM200, Retsch, Germany, at 30Hz, 45 seconds, 4 mm ball). Afterwards RNA was isolated by use of the SV 96 total RNA Isolation System (Promega, Prd. No. Z3500 according to manufacturers specifications (protocol No. 294) before it was treated with 10 µl each of RQ1 RNase-Free-DNase (Promega, Prd. No. M6101) according to manufacturers specifications. Equal amounts of RNA isolated from four single seeds harvested from one single plant was pooled before analysis by quantitative PCR.

[00192] Quantitative PCR analysis was carried out by use of the Access RT-PCR System (Promega, Prd. No. A1260) according to the manufacturers specifications. Under the used conditions the following amplification primers were hybridizing specifically to RNA of potato starch branching enzyme Class 3: St_BE-f2 (TCA GGT CTA CAA GTT GAC CCG A) and _BE-r2 (GTA GAA CCT TCC CTT TTG TGT GA). For monitoring expression levels the primer St_BE-Fam(2) labelled with two fluorescent dyes (FAM-CAT GAT CAC TCT AGC AAT CAA AGT GCC-TAMRA) was used.

[00193] For calculation of relative expression levels an endogenous mRNA present in all plants, coding S-adenosylmethionindecarboxylase was amplified in parallel by using the following amplification primers: S-AMD-F1 (GGC TTC GAC GCC TCT ACT CT) AND S-AMD-R2 (AAG GGC CAA AGC ACC TGA G). The primer FAM-S-AMD labelled with two fluorescent dyes (FAM-ACC CTC TTC ACC AGG TCG CCA-TAMRA) was included into each of the reactions.

[00194] The Q-PCR reaction was carried out each in a total volume of 30 µl comprising 350 ng RNA extracted from plants, AMV/Tfl reaction buffer (provided with Promega Prd. No. A1260), 3 mM $MgSO_4$, 500 nM of the respective primers, 0,2 mM of each desoxyribonucleotide, 0,6 µl reverse transcriptase, 0,6 µl Tfl Polymerase (according to Promega´s protocol 294) and in addition 150 nM fluorescent primer ST_BE-Fam(2) or 100 nM of fluorescent primer FAM-

S_AMD, respectively. Control reactions performed in parallel did not contain reverse transcriptase.

[00195] Reaction conditions for Q-RT-PCR:

Step 1: 55°C 30 minutes

Step 2: 94°C 2 minutes

Step 3: 94°C 15 seconds

Step 4: 60°C 1 minute

40 repeats were performed between step 3 and step 4.

[00196] The fluorescent signal was detected during step 4 with ABI Prism 7700 (Applied Biosystems) equipment.

[00197] Relative expression levels of the respective transcripts were calculated as described in M. W. Pfaffl (2001,"A new mathematical model for relative quantification in real-time RT-PCR", Nucleic Acids Res. 29(9):e45) Therefore the expression levels of transcripts coding potato branching enzyme Class 3 were calculated as relative amounts compared to the expression levels of transcripts coding S-adenosylmethionindecarboxylase, which is highly and consistently expressed during seed development in rice. The relative expression levels calculated as just described, are shown in Fig 1.

Patent claims

1. Genetically modified plant cell, characterised in that it has an increased activity of at least one Class 3 branching enzyme in comparison with corresponding wild type plant cells that have not been genetically modified.
2. Genetically modified plant cell according to Claim 1, wherein the genetic modification consists in the introduction of at least one foreign nucleic acid molecule into the genome of the plant.
3. Genetically modified plant cell according to Claim 2, wherein the foreign nucleic acid molecule codes a Class 3 branching enzyme.
4. Genetically modified plant cell according to Claim 3, wherein the said foreign nucleic acid molecule is chosen from the group consisting of

   a) Nucleic acid molecules, which code a protein with the amino acid sequence given under Seq ID NO 4;

   b) Nucleic acid molecules, which code a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence given under SEQ ID NO: 4;

   c) Nucleic acid molecules, which include the nucleotide sequence shown under Seq ID NO 3 or a complimentary sequence;

   d) Nucleic acid molecules, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);

   e) Nucleic acid molecules, which hybridise with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;

   f) Nucleic acid molecules, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; and

   g) Nucleic acid molecules, which represent fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).
5. Genetically modified plant cell according to one of Claims 2 to 4, wherein the said foreign nucleic acid molecule is chosen from the group consisting of

   a) T-DNA molecules, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (T-DNA activation tagging);

b) DNA molecules, which contain transposons, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (transposon activation tagging);

c) DNA molecules, which code a Class 3 branching enzyme and which are linked with regulatory sequences, which guarantee transcription in vegetable cells and lead to an increase in Class 3 branching enzyme activity in the cell.

d) Nucleic acid molecules introduced by means of in vivo mutagenesis, which lead to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects an increase in the expression of a gene coding a Class 3 branching enzyme.

6. Plant cell according to one of Claims 1 to 5, which synthesises a modified starch in comparison with corresponding wild type plant cells that have not been genetically modified.

7. Plant containing plant cells according to one of Claims 1 to 6.

8. Plant according to Claim 7, which is a starch-storing plant.

9. Plant according to Claim 7, which is a maize, rice, wheat, rye, oat, barley, cassava, potato, sago, mung bean, pea or sorghum plant.

10. Plant according to Claim 9, which is a potato plant.

11. Propagation material of plants according to one of Claims 7 to 10, containing plant cells according to one of Claims 1 to 6.

12. Harvestable plant parts of plants according to one of Claims 7 to 10, containing plant cells according to one of Claims 1 to 6.

13. Method for the manufacture of a genetically modified plant according to one of Claims 7 to 10, wherein

a) a plant cell is genetically modified, whereby the genetic modification leads to an increase in the activity of a Class 3 vegetable branching enzyme in comparison with corresponding wild type plant cells that have not been genetically modified;

b) a plant is regenerated from plant cells from Step a); and

c) if necessary, further plants are produced with the help of the plants according to Step b).

14. Method according to Claim 13, wherein the genetic modification consists in the

introduction of a foreign nucleic acid molecule into the genome of the plant.

15. Method according to Claim 14, wherein the said foreign nucleic acid molecule is chosen from the group consisting of

a) Nucleic acid molecules, which code a protein with the amino acid sequence given under Seq ID NO 4;

b) Nucleic acid molecules, which code a protein, the amino acid sequence of which has an identity of at least 50% with the amino acid sequence given under SEQ ID NO: 4;

c) Nucleic acid molecules, which include the nucleotide sequence shown under Seq ID NO 3 or a complimentary sequence;

d) Nucleic acid molecules, the nucleic acid sequence of which has an identity of at least 50% with the nucleic acid sequences described under a) or c);

e) Nucleic acid molecules, which hybridise with at least one strand of the nucleic acid molecules described under a) or c) under stringent conditions;

f) Nucleic acid molecules, the nucleotide sequence of which deviates from the sequence of the nucleic acid molecules identified under a), b), c), d), e) or f) due to the degeneration of the genetic code; and

g) Nucleic acid molecules, which represent fragments, allelic variants and/or derivatives of the nucleic acid molecules identified under a), b), c), d), e) or f).

16. Method according to Claim 14, wherein the said foreign nucleic acid molecule is chosen from the group consisting of

a) T-DNA molecules, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (T-DNA activation tagging);

b) DNA molecules, which contain transposons, which lead to an increase in the expression of a Class 3 branching enzyme gene due to integration in the vegetable genome (transposon activation tagging);

c) DNA molecules, which code a Class 3 branching enzyme and which are linked with regulatory sequences, which guarantee transcription in vegetable cells and lead to an increase in Class 3 branching enzyme activity in the cell;

d) Nucleic acid molecules introduced by means of in vivo mutagenesis, which lead to a mutation or an insertion of a heterologous sequence in at least one endogenous gene coding a Class 3 branching enzyme, wherein the mutation or insertion effects an increase

in the expression of a gene coding a Class 3 branching enzyme.

17. Method according to one of Claims 13 to 16, wherein the genetically modified plant synthesises a modified starch in comparison with corresponding wild type plants that have not been genetically modified.

18. Modified starch obtainable from a genetically modified plant according to one of Claims 7 to 10, from propagation material according to Claim 11, or from harvestable plant parts according to Claim 12.

19. Method for the manufacture of a modified starch including the step of extracting the starch from a plant cell according to one of Claims 1 to 6.

20. Method for the manufacture of a modified starch including the step of extracting the starch from a plant according to one of Claims 7 to 10.

21. Method for the manufacture of a modified starch including the step of extracting the starch from harvestable plant parts according to Claim 12.

22. Method for the manufacture of a derived starch, wherein modified starch according to Claim 18 or obtainable by means of a method according to one of Claims 19, 20 or 21 is derived.

23. Use of genetically modified plants according to one of Claims 7 to 10 for the manufacture of a modified starch.

24. Modified starch obtainable by means of a method according to one of Claims 19, 20 or 21.

25. Derived starch obtainable by means of a method according to Claim 22.

26. Use of modified starch according to one of Claims 18 or 24 for the manufacture of derived starch.

Abstract

The present invention relates to plant cells and plants, which are genetically modified, wherein the genetic modification leads to an increase in the activity of a Class 3 vegetable branching enzyme in comparison with corresponding wild type plant cells or wild type plants that have not been genetically modified. Furthermore, the present invention relates to means and methods for the manufacture of such plant cells and plants. Plant cells and plants of this type synthesise a modified starch. The present invention therefore also relates to the starch synthesised by the plant cells and plants according to the invention as well as to methods for the manufacture of the starch and to the manufacture of starch derivatives of this modified starch.

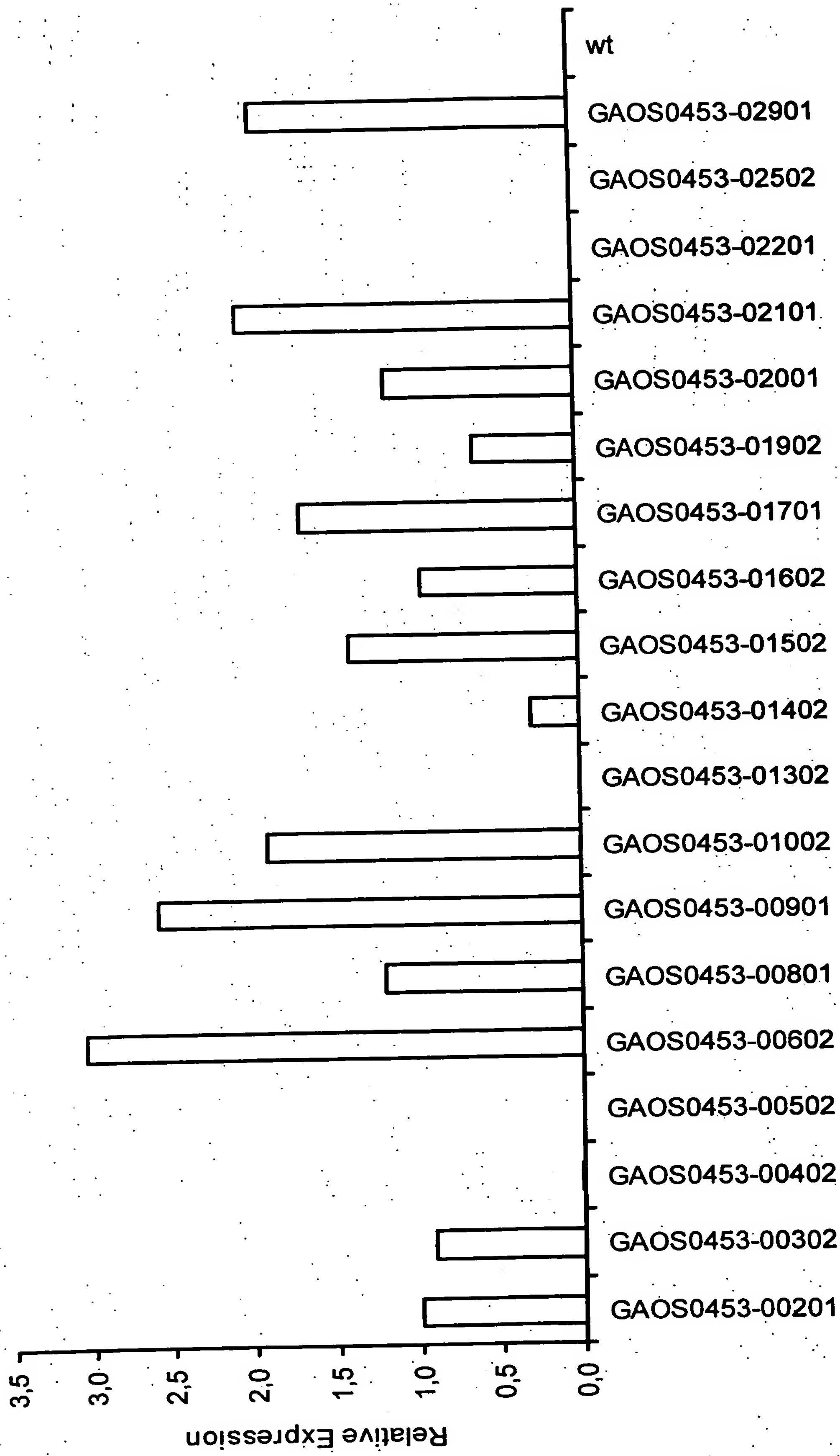
wt
GAOS0453-02901
GAOS0453-02502
GAOS0453-02201
GAOS0453-02101
GAOS0453-02001
GAOS0453-01902
GAOS0453-01701
GAOS0453-01602
GAOS0453-01502
GAOS0453-01402
GAOS0453-01302
GAOS0453-01002
GAOS0453-00901
GAOS0453-00801
GAOS0453-00602
GAOS0453-00502
GAOS0453-00402
GAOS0453-00302
GAOS0453-00201
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
Relative Expression

Fig 1

SwissProt Acc No. or Entry Name	Amino acid No.	SwissProt Acc No. or Entry Name	Amino acid No.
APU_THETU	1251-1331	Q9XED2	101-191
GLGB_SYNY3	22-110	Q08131	137-227
P71095	39-130	GLGB_HUMAN	73-168
Q9RXB0	181-274	Q9V6K7	52-144
PULA_KLEPN	301-395	Q22137	53-147
P70983	1143-1238	Q9RM63	25-149
Q41386	205-298	ISOA_FLASP	36-163
O64454	202-295	ISOA_PSEAY	30-155
O69008	105-191	P73608	22-122
O34587	104-189	O04196	74-177
Q9XDB5	231-319	Q9SPT7	8-110
PULA_THEMA	223-311	Q41742	114-218
Q59319	206-300	GLGX_HAEIN	10-101
YIEL_ECOLI	41-123	Q9RNH5	20-117
Q9RX51	22-100	GLGX_ECOLI	9-104
O66936	24-116	Q9RXP5	13-108
Q59832	141-233	GLGX_MYCTU	24-119
GLGB_STRAU	160-252	Q9X947	18-113
GLGB_BUTFI	24-116	P72691	19-120
GLGB_AGRTU	130-223	P95868	17-117
Q9RQI5	134-226	O84046	11-108
GLGB_ECOLI	122-214	Q9Z8F5	11-108
GLGB_HAEIN	122-214	Q9ZVT2	232-335
GLGB_SYNY3	126-217	Q44528	2-83
GLGB_MYCTU	127-223	Q9X2G0	276-357
Q9RTB7	26-115	Q9X2G0	15-98
GLGB_BACSU	23-115	Q45643	46-114
Q59242	23-115	Q9X2G0	126-217
O84874	117-209	TREZ_ARTSQ	5-90
O49185	62-153	TREZ_MYCTU	2-68
GLGB_YEAST	59-153	Q55088	1-79
Q9Y8H3	47-147	Q53641	1-79

Table 1 Amino acid sequences, contained in the "seed alignment", that are used for producing the HMM for the Pfam isoamylase domain (PF 02922). The table gives the "accession" number (Acc No) or the name (Entry Name), under which the corresponding amino acid sequences are entered in the SwissProt database. Those sections of the amino acid sequences of the corresponding SwissProt entry, which are part of the "seed alignment" (amino acid No.), are also given.

SwissProt Acc No. or Entry Name	Amino acid No.	SwissProt Acc No. or Entry Name	Amino acid No.
AMYM_BACLI	137-479	CDG1_PAEMA	46-426
MALZ_ECOLI	128-522	CDGT_BACOH	44-420
APU_THESA	393-821	AMYB_PAEPO	751-1107
APU_THEET	390-820	AMYA_ASPOR	34-390
CDAS_THEET	136-494	AMY1_DEBOC	49-405
NEPU_BACST	139-497	AMY1_SACFI	40-396
AMYM_BACAD	139-497	AMY1_ECOLI	193-611
AMY2_DICTH	138-470	ISOA_PSEAY	209-652
MALT_AEDAE	29-425	AMY_BUTFI	126-520
MAL2_DROME	30-432	AMY_BACSU	41-383
MAL3_DROME	31-428	AMY_THECU	40-392
MAL1_DROME	35-420	AMY_STRHY	37-360
MAXS_YEAST	17-441	AMY_STRGR	35-372
MAYS_YEAST	22-446	AMY_ALTHA	28-373
MA3S_YEAST	21-443	AMYA_AERHY	26-369
TREC_ECOLI	15-414	AMYC_HUMAN	26-413
TREC_BACSU	16-418	AMYA_DROME	29-396
O16G_BACSP	11-420	AMY1_AERHY	22-379
O16G_BACCE	13-419	AMT4_PSESA	38-387
DEXB_STRMU	13-394	AMY2_ECOLI	12-402
AMY_BACME	44-406	AMY_BACLI	34-420
AMY3_DICTH	39-381	AMY_BACAM	34-422
AMY_STRLI	77-520	AMT6_BACS7	40-426
CDGT_KLEPN	47-463	AMY3_WHEAT	26-348
AMYM_BACST	46-430	AM3A_ORYSA	29-367
CDGT_BACST	47-425	AMYA_VIGMU	24-361
AMYR_BACS8	46-425	AM2A_ORYSA	23-366

Table 2 Amino acid sequences, contained in the "seed alignment", that are used for producing the HMM for the Pfam alpha-amylase domain (PF 00128). The table gives the "accession" number (Acc No) or the name (Entry Name), under which the corresponding amino acid sequences are entered in the SwissProt database. Those sections of the amino acid sequences of the corresponding SwissProt entry, which are part of the "seed alignment" (amino acid No.), are also given.

Table 3 Information for producing the HMM for the Pfam isoamylase domain (PF 02922)

HMMER R2.0 [2.3.1]
NAME isoamylase_N
ACC PF02922
DESC Isoamylase N-term
LENG 121
ALPH Amino
RF no
CS no
MAP yes
COM hmmbuild -F HMM_ls.ann SEED.ann
COM hmmcalibrate --seed 0 HMM_ls.ann
NSEQ 65
DATE
CKSUM 3012
GA 2.3 2.3
TC 2.3 2.3
NC 2.1 2.1

XT		-8455	-4	-1000	-1000	-8455	-4	-8455	-4													
NULT		-4	-8455																			
NULE		595	-1558	85	338	-294	453	-1158	197	249	902	-1085	-142	-21	-313	45	531	201	384	-1998	-644	
EVD	-56.839790	0.222419																				
HMM		A	C	D	E	F	G	H	I	K	L	M	N	P	Q	R	S	T	V	W	Y	
		m->m	m->i	m->d	i->m	i->i	d->m	d->d	b->m	m->e												
		-32	*	-5527																		
	1	433	-2912	-5203	-4583	312	-4575	-3427	-2412	-4218	-2763	739	-4157	2303	-3877	-1058	-777	159	-2330	1852	3373	1
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10660	-11703	-894	-1115	-701	-1378	-32	*												
	2	-503	-4276	-455	1534	635	1339	-2632	-1609	373	78	463	-1115	-680	241	-2737	-924	-593	-1619	43	316	2
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10857	-11899	-894	-1115	-701	-1378	*	*												
	3	-806	-4386	-2899	-88	-1199	-4001	-313	-1878	1255	-1032	-3486	-2653	2668	-172	105	545	387	-400	-4594	-3936	3
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10916	-11958	-894	-1115	-701	-1378	*	*												
	4	-1972	-3101	-5615	-1806	2143	-2106	-3692	-829	-4575	2525	1112	-4465	-4871	-4199	-4376	-1753	-1159	-2514	-3558	1139	4
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10916	-11958	-894	-1115	-701	-1378	*	*												
	5	-1026	-6327	-1172	-753	-6643	3551	-4321	-471	-1174	-6434	-5732	-3689	-5515	-3996	-5049	-4652	-4943	-6008	166	-5877	5
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10941	-11983	-894	-1115	-701	-1378	*	*												
	6	2712	446	-5632	-1558	482	-1817	-3713	-635	-4593	-29	-2327	-4485	109	-4218	-4397	-260	-3237	343	-3582	161	6
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10941	-11983	-894	-1115	-701	-1378	*	*												

Table 3, Sheet 1/9

7 =	-1172	-4458	-2893	183	-1229	-4010	3316	-580	-1	-4467	-169	1206	-4102	-102	-67	428	1327	312	-4653	-3981	7
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10941	-11983	-894	-1115	-701	-1378	*	*												
8	-427	-3201	-5058	-841	1372	-4749	-3587	346	-159	-603	-2400	-4198	1637	-1158	168	-1606	-1672	834	1850	2394	8
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-335	-10941	-2276	-894	-1115	-701	-1378	*	*												
9	-554	121	1665	593	-4483	-1316	276	7	-1953	322	-3267	244	-1346	1174	-268	144	-340	-577	-4365	380	9
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-365	-10608	-2164	-894	-1115	-3823	-106	*	*												
1 0	797	-3873	616	858	-4188	1176	-2048	-3935	-458	-1843	-2963	-2026	1626	-1590	99	164	-514	-1189	683	-15	10
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-46	-10244	-5043	-894	-1115	-4637	-59	*	*												
1 1	-14	-3841	1826	1314	-810	836	-2009	-1276	467	-1532	-2931	448	230	775	-2097	-2257	-855	-888	-4026	-3345	11
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1075	-10201	-931	-894	-1115	-1364	-709	*	*												
1 2	-847	832	1648	-1300	-3762	-553	1139	-810	389	-1423	2049	1275	-3064	738	-253	-621	912	-3067	-3637	-2959	12
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-511	-9739	-1751	-894	-1115	-5168	-41	*	*												
1 3	-2797	-4407	-1367	2261	-4735	892	-2276	-4550	-2156	-4468	-3642	1207	-3560	823	-2778	-2580	2401	-4063	-4646	-3831	13
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-305	-9232	-2404	-894	-1115	-5452	-33	*	*												
1 4	-88	1322	-3700	1196	-1379	-398	1869	1265	-2718	-141	1929	-2663	-3139	-2380	-2591	-2162	-1503	1517	-1876	-1529	14
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-90	-8931	-4097	-894	-1115	-5563	-31	*	*												
1 5	-1344	-2813	2298	288	602	-240	1306	-2880	499	-2828	-1903	1507	-2408	683	-1068	-1224	-1284	-289	-2998	-2315	15
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-139	-8846	-3483	-894	-1115	-4086	-88	*	*												
1 6	-1947	-2556	-4788	-5046	-5091	3282	-4399	-4858	-4947	-5141	-4214	-3556	477	-4449	-4699	816	-2415	335	-5331	-5237	16
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1391	-8903	-698	-894	-1115	-2384	-307	*	*												
1 7	1320	-2772	-1292	2128	-3091	-2427	-1158	-2783	864	-2816	-1944	-1122	1166	-729	-1233	-1401	-1440	802	-3046	-2410	17
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8803	-9845	-894	-1115	-1304	-749	*	*												
1 8	-165	-3738	1692	-454	-4041	-89	-1948	-3779	1272	-1513	-2833	353	-3378	-1495	-2044	-2198	459	2044	-3933	-3260	18
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10095	-11137	-894	-1115	-1909	-447	*	*												
1 9	500	-3988	418	2	-4310	1492	-2148	-4060	805	-4005	-3078	1770	-1034	395	-585	203	-470	-1409	-4172	-266	19
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-32	-10365	-5558	-894	-1115	-138	-3458	*	*												
2 0	-904	-4476	-607	-506	-1213	2552	-196	-696	627	-4492	-3565	-12	-360	186	-434	81	-490	-4098	-4659	-771	20
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10917	-11959	-894	-1115	-250	-2654	*	*												

Table 3, Sheet 2/9

2 1	-903	-3200	-5719	-5083	-433	-1893	-3792	860	-4678	-1338	-2403	-4567	-543	-4301	-4478	-4006	2145	2518	1631	512	21
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 2	-1902	-4488	-1380	-132	190	-4097	-526	406	-450	-4488	-3587	1974	-4189	-2312	1656	-1028	1578	714	-4694	444	22
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 3	-1835	-3207	-5724	-5089	3969	-2056	-3796	-432	-4684	-325	-2409	-4572	-4977	-4306	-1411	-1974	-3321	-410	-3659	1564	23
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 4	1377	1196	-1346	-2546	-4550	-4149	-2821	-1804	963	-2327	-3447	-2834	-1077	-2403	2409	501	896	-3897	-4578	531	24
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-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 5	-1482	-3277	-1253	931	-116	-5013	-3887	-1194	-4761	1669	-2465	-4654	-5058	-4386	-4568	-4099	-3396	2623	-3750	265	25
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 6	-7635	-6573	-7990	-1924	2064	-1893	-4102	-6546	-7815	-5859	-5949	-6513	-7759	-6639	-1618	-7150	-7486	-6697	5535	2570	26
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 7	2849	-4354	-5323	-4910	-5332	-4813	-4712	-4952	-1677	-1991	-4458	-1206	-5320	-4560	-4834	2037	97	-4553	392	-5256	27
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 8	-464	-4943	-3578	156	-5759	-1752	-3603	-5508	-1616	-5465	-4564	-3477	3730	-3175	-1215	697	-1675	-4961	-5617	-4985	28
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
2 9	-36	-4571	-945	163	-4892	336	2269	-2129	-74	-4587	-3661	2138	-4166	261	-1460	-822	1414	-682	-4755	700	29
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
3 0	3362	-5060	-3960	-1527	-6477	-2136	-4534	-6257	-4423	-6303	-5432	-1004	-811	-1072	-4921	178	-4321	-1832	-6500	-5893	30
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-18	-11023	-6420	-894	-1115	-701	-1378														
3 1	-1049	-4555	148	1463	-4875	-4058	-2716	-993	1147	-2673	-863	-983	-4151	1892	1235	-590	1202	-788	-4739	-834	31
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11006	-12048	-894	-1115	-444	-1916														
3 2	331	-4572	491	954	-1179	489	-470	-4643	352	-2337	-3661	1027	-1906	-33	1510	470	-638	-1807	122	-866	32
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
3 3	922	36	-7042	-6525	-4477	-6466	-5600	-626	-6240	-1110	-433	-6118	-6412	-5948	-2134	-5634	-4511	3460	-5365	-4988	33
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-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														
3 5	-2161	-4635	-7592	-7120	-1252	-1604	-6387	540	-6901	2467	-3458	-6804	-6949	-6529	-6803	-6367	-5011	2356	-5892	-5607	35
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-11023	-12065	-894	-1115	-701	-1378														

Table 3, Sheet 3/9

36 =	557	2801	-1721	-4985	-388	-4905	-248	1189	140	248	-41	-4518	-4956	-1129	-1396	-1302	194	1652	-3666	-218	36
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-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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-	-786	-9617	-1256	-894	-1115	-5379	-35	*	*												
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-	-145	-500	232	43	-381	398	105	-627	210	-466	-721	275	393	48	95	359	117	-370	-295	-246	
-	-4000	-1761	-638	-49	-4913	-5694	-28	*	*												
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49	-3100	-4560	-1116	1388	96	-908	885	-119	-725	-1440	1409	536	-4169	1003	1235	22	807	-488	-4746	-4067	50
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
- -	-1	-11023	-12065	-894	-1115	-701	-1378	*	*												

Table 3, Sheet 4/9

50	941	-115	-708	1773	-4860	-1149	-2738
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51	-420	-3382	-1879	-4044	439	-4712	3032
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
52	-1952	-4573	-58	669	-4895	-4073	-2732
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
53	-1019	-3213	-1623	-1804	-243	-4921	-3789
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
54	-1227	-4571	654	1153	-4892	-1716	1453
	-149	-500	233	43	-381	399	106
	-404	-11023	-2038	-894	-1115	-701	-1378
55	-2745	-4145	-2622	504	-415	-3731	392
	-149	-500	233	43	-381	399	106
	-1381	-10620	-700	-894	-1115	-4109	-86
56	-1634	-2867	129	-1035	-3099	918	-1317
	-149	-500	233	43	-381	399	106
	-1723	-9243	-524	-894	-1115	-4411	-69
57	-1133	-2513	-524	1978	-2771	1477	-678
	-149	-500	233	43	-381	399	106
	-1253	-7810	-796	-894	-1115	-3061	-184
58	-994	-1426	1440	-1034	-1461	-2223	-963
	-149	-500	233	43	-381	399	106
	-7	-8190	-9232	-894	-1115	-906	-1100
59	-2441	-3911	36	615	-610	-1517	1889
	-149	-500	233	43	-381	399	106
	-78	-10278	-4270	-894	-1115	-1209	-817
60	-272	-4175	1427	-249	-4496	825	-235
	-149	-500	233	43	-381	399	106
	-81	-10580	-4214	-894	-1115	-1882	-456
61	-713	-4275	2377	1673	-4595	133	-2427
	-149	-500	233	43	-381	399	106
	-1	-10626	-11668	-894	-1115	-373	-2136
62	-443	-4504	216	-81	1410	1699	-313
	-149	-500	233	43	-381	399	106
	-1	-10947	-11990	-894	-1115	-198	-2966
63	-1102	-4838	403	-2956	-707	3185	-502
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378

-824	-1301	-2538	698	-1344	-4171	-814	930	554	1279	-254	-4739	-4062	51
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
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*	*												
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*	*												
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*	*												
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*	*												
-4166	1748	-594	-372	-768	1315	-1943	1913	493	-1052	-1625	-4347	183	56
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*	*												
-330	201	713	-1982	-1326	-2738	-894	930	1536	714	-2441	-3108	-2486	57
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*	*												
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*	*												
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*	*												
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*	*												
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*	*												
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*	*												
-4575	-1074	-4520	-3593	1620	-329	2	-304	636	-837	-4126	-4687	-209	63
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-4688	-3155	-4786	-746	1368	-4754	-1258	-3662	-3660	-3684	-4391	-4953	421	64
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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Table 3, Sheet 5/9

64	-990	-3200	-5718	-5082	406	-4921	-3792
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65	-7684	-6590	-8044	-8406	1262	-7926	-4105
	-149	-500	233	43	-381	399	106
	-24	-11023	-5937	-894	-1115	-701	-1378
66	-1081	-39	-645	2092	-4866	-2001	3120
	-149	-500	233	43	-381	399	106
	-1	-10999	-12041	-894	-1115	-387	-2088
67	1191	1498	-5739	-5104	-3173	-675	-3816
	-149	-500	233	43	-381	399	106
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68	-607	-4400	-3047	467	2483	-4124	-415
	-149	-500	233	43	-381	399	106
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69	-1125	-3258	-5787	-5155	-3223	-430	-3875
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	-1	-11023	-12065	-894	-1115	-701	-1378
70	-1005	-4574	94	1232	-1268	-949	305
	-149	-500	233	43	-381	399	106
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72	727	-2766	1622	-596	-3081	-2270	1180
	-148	-501	232	48	-382	397	104
	-3941	-523	-2066	-22	-6038	-5709	-28
73	-2095	-3593	2287	-826	-4113	136	-1685
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74	-3370	-3802	-3346	-3527	-5496	3620	-3660
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75	-1261	2000	664	-2358	951	-2717	-1566
	-149	-500	233	43	-381	399	106
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76	892	-4282	1991	467	-4556	495	-2583
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77	-874	-3305	-4976	-1454	194	-2338	-3621
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
78	-357	-4572	685	917	-4893	291	1424
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Table 3, Sheet 6/9

79	-660	139	903	1067	-4364	1116	2881
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	-351	-10488	-2216	-894	-1115	-3008	-192
80	-1185	335	497	-1714	-4146	2833	-2042
	-149	-500	233	43	-381	399	106
	-490	-10207	-1801	-894	-1115	-4876	-50
81	961	-3448	-1830	-230	-3765	-909	654
	-149	-500	233	43	-381	399	106
	-2627	-9720	-257	-894	-1115	-5316	-37
82	-1425	-2189	-1160	-1096	-3294	2933	-1286
	-150	-501	232	42	-381	402	105
	-2273	-761	-2301	-1549	-603	-1681	-539
83	77	-3267	-66	57	205	2688	-1433
	-149	-500	233	43	-381	399	106
	-3	-9452	-10494	-894	-1115	-1361	-711
84	627	582	-868	-3565	-2609	-4071	385
	-149	-500	233	43	-381	399	106
	-2	-10259	-11301	-894	-1115	-33	-5486
85	-998	-272	-1312	147	944	-4088	-2749
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
86	-4871	-522	-7273	-6801	-4006	-6725	-5389
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
87	7	-4545	-2961	83	-4853	1479	-96
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
88	-1905	-3714	-6172	-5598	2582	-5424	-3923
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
89	-491	-44	-3807	1600	-142	-4457	-3193
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
90	-381	192	-5979	-5354	1663	-5204	-4093
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
91	-1360	856	1256	-178	-448	-4116	2442
	-149	-500	233	43	-381	399	106
	-52	-11023	-4840	-894	-1115	-701	-1378
92	-1767	-4492	391	-332	-4797	2082	1139
	-149	-500	233	43	-381	399	106
	-1	-10972	-12014	-894	-1115	-256	-2623
93	-166	-653	1178	-302	-1166	473	1013
	-149	-500	233	43	-381	399	106
	-23	-11023	-6015	-894	-1115	-701	-1378

-1448	-444	-1437	-3153	877	1160	-1812	-2358	-2514	-2565	-571	-4253	-3580	82
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-3887	-556	-1696	-2934	1660	-3471	-1588	-450	-830	-926	-3452	-4032	-3359	83
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-3512	-1203	-3462	-2539	47	-3054	1533	-1710	1907	1572	-3068	-3635	-139	84
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-3062	1835	-3036	-2313	-1209	-2398	-964	-760	-1448	-1559	-2556	-2967	-2661	85
-621	209	-465	-721	274	393	44	95	358	120	-370	-295	-250	
-3332	-1020	-3281	-2359	196	-2864	490	112	-1682	-253	-2887	-3453	-2771	89
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-2156	-731	530	1415	-3416	-4131	1816	-3398	-1179	229	1180	1903	1485	90
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4547	636	767	-3613	-779	-4180	238	1884	-541	-545	-490	-4716	1812	91
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
401	-6490	-2106	-3511	-6303	-6634	-298	-6337	-5905	-4829	209	-4919	4584	92
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4595	2534	-252	-347	-2720	-4173	-532	-337	-1539	-525	-1911	-4736	5	93
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
369	-837	-1692	-2896	-4990	-5458	-4757	-4969	-4518	-3857	-847	261	4039	94
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-179	356	-893	-442	-1006	-4533	-1131	2679	-2040	-1632	-273	-4076	53	95
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
2161	-4960	280	1877	-4850	-5237	-4582	-4765	-4296	-3560	2082	-3938	236	96
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-140	738	-1771	-3532	-893	-4207	-601	1	-1669	1115	658	2043	-1166	97
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-650	-2283	-2336	-3585	798	-1471	-2241	342	-592	898	872	-4684	-4011	98
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-1718	-621	-4575	-3651	922	1911	-938	-89	-2982	-235	-1085	9	1464	99
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	

Table 3, Sheet 7/9

94 =	-17	-4552	-1435	-686	585	753	1661	-4623	-482	-4568	-3641	1595	-510	-798	-1193	843	-1359	-4174	858	596	100
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-1352	-11001	-718	-894	-1115	-1381	-699														
95	990	-3393	-409	-208	-3713	-2897	1789	-3462	1102	-1191	-2483	165	1197	777	-1644	-519	-1862	-3014	3290	326	101
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-154	-9651	-3326	-894	-1115	-5359	-36														
96	-2694	-4027	-1734	21	1263	-3320	986	-4084	-2097	-4097	-3279	170	3097	-1914	-2648	1632	-2688	-3687	-4239	-3490	102
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-212	-9501	-2885	-894	-1115	-5443	-34														
97	590	-3111	230	1845	424	-2623	751	-3174	424	-3125	-2201	-1260	-2717	700	-1372	-1531	1287	-2730	-3297	1665	103
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	-1738	-9292	-517	-894	-1115	-5540	-31														
98	763	-3278	2505	1841	-3526	-1860	-998	-3362	-969	-3273	-2473	1657	-2265	-619	-1653	-1329	-1592	-2876	-3460	-2597	104
	-143	-505	238	38	-376	401	100	-629	210	-470	-726	274	388	42	90	364	117	-364	-269	-255	
	-1546	-1217	-2137	-4002	-93	-2398	-303														
99	924	1118	-1238	1857	-3128	-2357	-1016	-2870	1001	-799	-1912	420	-2450	1522	180	-1265	-1317	-447	-3010	-2336	122
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-4	-8916	-9958	-894	-1115	-776	-1266														
100	-4244	-5377	-645	-3281	-6758	3521	-4264	-6619	-4334	-6569	-5824	-3559	-5159	-467	-955	-491	-238	-5843	-6723	-5952	123
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-1366	-10466	-710	-894	-1115	-4472	-67														
101	-1545	-2628	-3	-1022	-2810	-2587	3746	-2470	-928	-66	1100	1005	-2677	1275	-1401	87	-1485	40	-2901	-2314	124
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-4	-9104	-10146	-894	-1115	-4056	-89														
102	-1738	-3101	318	-1072	-3394	-2715	-1350	-3113	293	-902	-2201	-1366	-2803	625	2944	-213	-1671	-2712	1867	1672	125
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-4	-9260	-10302	-894	-1115	-3745	-112														
103	-1830	1786	-1979	181	3110	-2914	-1599	-2494	187	-2661	-1872	348	-2999	382	-17	-1850	-1768	-164	-3033	1694	126
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-3	-9439	-10481	-894	-1115	-3895	-100														
104	-486	-3147	2145	605	-3366	-2937	-1627	489	-1269	-3119	-2267	2387	-3039	-1211	-1759	-421	-1882	354	-3396	422	127
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-3	-9567	-10609	-894	-1115	-193	-2999														
105	-1642	-4357	-2912	1666	-1270	-1006	1125	-809	-1170	-1665	-3460	317	1944	1076	-1285	-904	-1341	651	1747	-760	128
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-30	-10913	-5643	-894	-1115	-2658	-249														
106	-1173	-4422	150	150	-4731	-3955	-2614	874	758	-114	-3514	894	-4047	971	-224	68	369	-36	2895	-960	129
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-1	-10885	-11927	-894	-1115	-400	-2047														
107	-3107	-192	-1522	-578	-1688	-1620	-372	-949	1499	-102	-430	1040	942	-2398	1137	-958	-317	885	-4527	579	130
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-1	-10996	-12038	-894	-1115	-1491	-634														
108	-3341	-3194	1900	485	588	-4869	-297	-72	-4523	1289	-2395	-4458	-4921	-4178	-1295	-2068	-1548	979	2426	1188	131
	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-21	-10996	-6189	-894	-1115	-363	-2168														

Table 3, Sheet 8/9

10 9	-117	-4097	-3254	-1038	-4244	-4216	-2903
	-149	-500	233	43	-381	399	106
	-1	-11003	-12046	-894	-1115	-420	-1984
11 0	1344	-4030	-1481	-678	-4152	-4269	-2964
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
11 1	-4562	-5414	3854	-4419	-7555	-1661	-5445
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
11 2	375	-4583	-3848	-1187	-4813	-4730	-3382
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
11 3	-4784	-428	-6779	-6355	582	-1779	-3987
	-149	-500	233	43	-381	399	106
	-1	-11023	-12065	-894	-1115	-701	-1378
11 4	3042	-4607	-6209	-6125	-6739	540	-5868
	-149	-500	233	43	-381	399	106
	-1	-10994	-12036	-894	-1115	-701	-1378
11 5	-1554	-4254	-3118	-2567	1616	-4149	-141
	-149	-500	233	43	-381	399	106
	-1	-10994	-12036	-894	-1115	-701	-1378
11 6	1683	-4540	70	592	1140	57	-2707
	-149	-500	233	43	-381	399	106
	-1	-10994	-12036	-894	-1115	-701	-1378
11 7	435	976	-5691	-5055	1014	200	-3764
	-149	-500	233	43	-381	399	106
	-1	-10994	-12036	-894	-1115	-701	-1378
11 8	116	-4535	432	1251	-4851	-355	368
	-149	-500	233	43	-381	399	106
	-1	-10731	-11773	-894	-1115	-701	-1378
11 9	89	40	704	-356	-4621	997	-259
	-149	-500	233	43	-381	399	106
	-1	-10731	-11773	-894	-1115	-701	-1378
12 0	-2839	-4311	1556	-525	-4632	-1454	-2471
	-149	-500	233	43	-381	399	106
	-1	-10731	-11773	-894	-1115	-701	-1378
12 1	-2838	-4293	113	-626	-544	1423	-2474

-119	1662	837	-3236	-2962	385	-851	1231	-865	302	1173	-4396	-3839	132
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
1060	-984	1062	-3176	-1173	117	-2623	-546	-280	815	530	-4346	-540	133
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-7459	-5967	-7537	-6744	-4536	732	-5224	-6607	436	-1693	-6356	-7702	-7065	134
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-1424	-2824	-4555	-3786	-3528	3834	-978	62	-3761	-1326	-4174	-4874	-1076	135
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4061	-5937	-2040	53	634	-6164	-5379	-677	-5268	-4716	-4009	3313	4259	136
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
200	-6057	-6710	-5828	-1234	-5611	733	-6130	211	-764	-5531	-6964	-6720	137
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-1803	2314	-2413	-3377	-165	956	-1065	1741	-3071	1002	-1581	-4514	-3916	138
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4608	-453	-2223	-3630	225	-4141	-1025	-156	165	-3012	-819	-4725	1981	139
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
1242	-4650	303	-37	-4539	-4943	-323	-4450	-22	-536	1867	-3630	123	140
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-1120	-2291	-4549	-3626	-417	-308	-474	-2798	926	847	1511	-4721	-101	141
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4370	321	-318	-718	-2448	-399	482	-193	844	-1010	1049	-4488	-3807	142
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4383	-368	-1184	-3401	2127	1394	-2011	2020	-74	-1349	-3933	793	-3812	143
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4352	-2058	-2372	-3384	22	2430	131	-621	781	-851	451	-4481	-3803	144
	0												

Table 3, Sheet 9/9

Table 4 Information for producing the HMM for the Pfam alpha-amylase domain (PF 00128)

HMMER	2.0 [2.3.1]
NAME	alpha-amylase
ACC	PF00128
DESC	Alpha amylase, catalytic domain
LENG	
ALPH	Amino
RF	no
CS	no
MAP	yes
COM	hmmbuild -F HMM_ls.ann SEED.ann
COM	hmmcalibrate --seed 0 HMM_ls.an
NSEQ	54
DATE	
CKSUM	2797
GA	-82.0 -82.0
TC	-81.7 -81.7
NC	-82.7 -82.7

XT		-8455	-4	-1000	-1000	-8455	-4	-8455	-4													
NULT		-4	-8455																			
NULE		595	-1558	85	338	-294	453	-1158	197	249	902	-1085	-142	-21	-313	45	531	201	384	-1998	-644	
EVD	-218.894150	0.133020																				
HMM		A	C	D	E	F	G	H	I	K	L	M	N	P	Q	R	S	T	V	W	Y	
		m->m	m->i	m->d	i->m	i->i	d->m	d->d	b->m	m->e												
		-36	*	-5356																		
	1	-1605	-4092	285	925	969	-202	244	-4163	-1052	-4108	-3181	-2229	-3686	3256	-723	-566	423	-3713	766	-3593	1
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-28	-10485	-5739	-894	-1115	-701	-1378	-36	*												
	2	-2887	-2711	-5230	-4597	-2673	-1822	-3316	3045	-4195	522	-1917	-883	-4488	-3820	-3998	-1684	-306	1681	-3182	-282	2
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-2	-10458	-11500	-894	-1115	-427	-1963	*	*												
	3	-1209	-2710	-5229	-4593	2368	-4432	278	1011	-4188	444	1689	-4078	-4481	-3811	-3988	-3516	516	317	-3167	2755	3
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
	4	-275	-2705	-5221	-4585	448	-1450	-3297	-30	-4181	-155	899	-4071	2650	-3804	-3982	-1376	1224	1419	-3163	-2821	4
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
	5	-668	-4093	2249	318	-4414	-1377	2291	-4165	-28	-4109	-3182	-743	-954	1554	1650	-2500	-348	-1759	-4276	-3593	5
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
	6	-472	-3803	-3114	-943	-4039	851	-2739	-3669	-2370	385	-3045	-2815	-4109	-2392	2651	1729	-2901	-3408	-4184	328	6
	-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
	-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

7	-1460	-4497	-7939	-6833	4401	-1492	-4848
	-149	-500	233	43	-381	399	106
	-1	-10485	-11527	-894	-1115	-701	-1378
8	1015	-4092	-2467	1414	-4412	-3593	301
	-149	-500	233	43	-381	399	106
	-474	-10485	-1840	-894	-1115	-701	-1378
9	-798	-3710	1318	381	-4030	-3204	-1867
	-149	-500	233	43	-381	399	106
	-2	-10013	-11055	-894	-1115	-3804	-107
10	-754	-3691	95	139	-4012	2378	-1850
	-149	-500	233	43	-381	399	106
	-283	-10013	-2495	-894	-1115	-323	-2316
11	-2420	-3619	3319	-531	-3837	-1144	-2112
	-149	-500	233	43	-381	399	106
	-87	-10204	-4120	-894	-1115	-3240	-161
12	-1036	-3694	-489	-1650	-3978	-3303	-1966
	-149	-500	233	43	-381	399	106
	-2	-10119	-11161	-894	-1115	-3527	-131
13	-1310	-3777	1225	-400	-4097	-3280	-1939
	-149	-500	233	43	-381	399	106
	-2	-10119	-11161	-894	-1115	-3527	-131
14	-2309	669	102	248	-4055	1478	544
	-149	-500	233	43	-381	399	106
	-166	-10119	-3211	-894	-1115	-3527	-131
15	507	-4662	3087	-356	-4951	-3666	-2603
	-149	-500	233	43	-381	399	106
	-983	-9955	-1020	-894	-1115	-3928	-98
16	-1432	-2900	-1279	454	-3222	-2404	849
	-149	-500	233	43	-381	399	106
	-224	-8976	-2818	-894	-1115	-4922	-48
17	347	-2735	145	858	-3055	-1	-898
	-150	-501	237	45	-381	400	105
	-3921	-996	-1208	-31	-5562	-5023	-45
18	-806	-2136	-672	725	-2409	-1787	2069
	-149	-500	232	42	-381	398	105
	-3106	-442	-2758	-37	-5313	-5259	-38
19	-1101	-1851	-1203	-809	-1107	-2079	2497
	-149	-500	233	43	-381	399	106
	-10	-7715	-8757	-894	-1115	-3229	-163
20	456	-2091	880	-981	-1511	-2393	-977
	-149	-500	233	43	-381	399	106
	-7	-8293	-9336	-894	-1115	-1105	-902
21	-4548	-5007	-4752	-4756	-6164	3702	931
	-149	-500	233	43	-381	399	106
	-923	-9690	-1085	-894	-1115	-4348	-73

-946	-6493	-1435	-3124	-5813	-6017	-5797	-6161	-4986	-4659	-3568	-4250	-3409	7
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-3781	-229	-3725	-2800	1805	-3300	-1408	1149	-673	-500	-3332	4434	-3210	9
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-3763	799	-3707	-2780	504	-3285	226	170	-222	-208	-3313	-3874	686	10
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-3520	-1746	-919	-489	654	-3528	-1695	-2232	-35	-195	-922	-3868	-169	11
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-873	862	-3694	-2794	-232	2148	-1519	-889	1520	-1384	-893	1820	-3242	12
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-948	123	-916	-2866	1965	-671	-1479	669	1690	587	-3398	-3961	-3279	13
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-181	276	-1468	-2841	2669	-3381	-463	-2039	-2195	-130	-963	-3940	-3266	14
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-4742	-2381	-4670	-3801	1868	-3945	102	-2969	458	-3056	-864	-4846	-4077	15
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-2804	-479	-1002	-1825	-875	318	1050	656	1298	635	-2356	-2919	-2237	17
-627	212	-467	-721	276	393	44	95	358	116	-370	-295	-250	
-2122	-79	-2136	-1251	1334	-1889	-31	-576	1266	1192	187	-2362	-1714	19
-623	211	-464	-721	275	393	45	97	359	117	-367	-295	-247	
-1776	-717	-1890	-1184	-983	2208	-661	-1099	1211	-1094	-1532	-1558	2020	21
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-1843	-820	-1991	-1264	-1188	-2490	-787	1164	-1376	-1276	-1631	3621	2948	22
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-6660	-3624	-6413	-5801	-4630	-5444	-4302	-411	-4656	-4785	-5961	-5743	-5570	23
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	

Table 4, Sheet 2/32

22	740	-2742	752	-578	1125	-55	1540	-2808	674	-2756	-1832	332	-2345	-452	691	1244	-1216	-2362	-2927	-2247	24
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-158	-8772	-3303	-894	-1115	-5017	-45	*	*												
23	1093	-1981	783	-929	714	-2349	1735	-79	-817	-649	-1134	774	455	-742	-1242	-1294	1299	-1479	-2316	-1803	25
-	-148	-501	232	42	-374	397	104	-628	211	-465	-722	276	395	44	95	360	119	-371	-296	-248	
-	-3784	-111	-9662	-19	-6287	-5076	-43	*	*												
24	1491	-2213	1203	-932	-2512	145	-1141	-177	-842	-2307	-1499	-1168	508	-775	-1296	1473	-1252	-226	-2655	-2101	27
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8620	-9662	-894	-1115	-5076	-43	*	*												
25	-1203	-2674	235	871	-2992	1087	-833	-2742	-420	-2689	-1765	853	-2264	1628	-929	525	1091	-2295	2230	-2175	28
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8620	-9662	-894	-1115	-5076	-43	*	*												
26	-1213	2805	793	588	121	632	-986	-1897	-694	-2062	1632	794	-2381	-630	-1146	-1229	64	-1647	-2434	1661	29
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8620	-9662	-894	-1115	-5076	-43	*	*												
27	339	2653	576	-652	-2518	-2231	1886	301	-556	-751	-1446	1155	-2320	-504	1181	294	-1135	-1876	-2586	-1989	30
-	-150	-501	235	44	-382	397	104	-624	211	-467	-722	276	394	44	95	360	121	-369	-296	-251	
-	-3784	-111	-9662	-19	-6287	-5076	-43	*	*												
28	-39	-2624	1833	352	-2924	-2171	-840	315	-433	-360	-1720	2015	-2269	1105	-939	-43	-1140	-2235	-2820	-2149	32
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1468	-8620	-653	-894	-1115	-5076	-43	*	*												
29	-1168	-1761	-1657	-1066	-1714	1555	-762	-1800	-73	-1896	-1201	-1120	-2243	-520	2066	-1254	-1145	-1562	4088	-1308	33
-	-150	-501	239	44	-382	397	104	-627	209	-465	-722	276	395	44	95	358	116	-370	-282	-247	
-	-2331	-890	-1933	-1947	-433	-3740	-112	*	*												
30	-1006	-2546	1900	1847	-2841	-1663	-540	-2615	-256	-2550	-1674	-283	1442	-116	1044	-835	-972	-2160	-2724	-1985	38
-	-149	-500	234	44	-381	398	105	-627	211	-466	-721	278	393	45	95	359	117	-367	-295	-250	
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31	-1276	-1857	-3073	-3276	-3951	-2079	-3114	-3699	-3291	-3965	-3211	-2515	3791	-3088	-3258	-1512	1591	-2799	-4068	-3935	40
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-	-10	-7741	-8783	-894	-1115	-5295	-37	*	*												
32	1795	-2196	-565	897	-2705	-1787	-749	-2424	-444	-2454	-1592	1798	-2035	-339	-950	-891	1554	-1990	-2686	-2033	41
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-	-567	-7741	-1643	-894	-1115	-4278	-76	*	*												
33	1019	-2549	1220	15	-2866	-1686	-602	-2639	-347	-2589	-1721	1280	-1948	2872	-909	-878	-1019	-2187	-2775	-2035	42
-	-146	-500	232	43	-381	398	105	-627	213	-466	-721	275	393	45	95	359	117	-370	-295	-244	
-	-2649	-255	-8527	-44	-5058	-5334	-36	*	*												
34	-842	-2187	1083	-73	-2670	1600	-538	-2418	-193	-2392	-1509	-373	-1867	-113	1666	1096	-836	-1956	-2579	-1901	44
-	-151	-502	235	41	-383	403	103	-629	211	-466	-723	273	396	43	94	357	121	-372	-297	-236	
-	-2649	-1232	-1269	-2921	-204	-4299	-75	*	*												
35	-468	-852	-1748	-1375	-1367	-1561	-1139	2029	-1215	-1183	-541	-1214	1812	-1077	-1420	1463	-613	-493	-1794	-1390	53
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-	-15	-7122	-8164	-894	-1115	-3735	-113	*	*												
36	844	-2120	-541	1228	-2414	-1688	-358	-2139	1304	-2120	-1225	1410	-1794	86	-407	-628	-674	-1730	3129	-1660	54
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-10	-7701	-8743	-894	-1115	-1998	-416	*	*												

Table 4, Sheet 3/32

37	590	-1848	-1080	-1680	-1869	-153	-1528	902	-1529	1445	-1028	-22	-313	-1404	-1840	-451	-1448	-1302	2063	-1818	55
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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38	-1473	-2944	660	-772	-3266	-2446	1929	-3015	1777	-635	-2033	793	-2539	543	1810	54	-163	-2566	-3126	-2445	56
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39	-1602	-3045	1094	301	197	-2580	1251	-3095	1910	-87	975	38	-2673	-785	-1331	196	912	-2660	-3236	-2561	57
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40	-360	-4540	-6105	-6279	3176	-5925	-2337	-4407	-18	-3916	-3879	-4657	-5814	-4740	-5283	-5144	-5247	-4497	2202	3735	58
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-	-4	-9230	-10272	-894	-1115	-4772	-54	*	*												
41	-2207	3448	-4383	-3804	2865	-3703	2211	-1531	-3416	-289	-1230	-3250	-3744	415	-3228	-2791	56	-1457	1995	950	59
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9230	-10272	-894	-1115	-1292	-757	*	*												
42	-2335	1113	-4673	-4038	-357	2872	413	1190	-3635	-2012	-1368	-3526	-3932	-3260	-3439	-2966	-823	489	2156	-2272	60
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43	-5229	-5553	-6123	-6490	-6106	3663	-6156	-7798	-6977	-7616	-7095	-503	-6308	-6630	-6847	-5444	-5649	-6847	2842	-5752	61
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45	-7012	-5986	-7498	-7818	1401	-7363	936	-5780	-7378	2298	-817	-6000	-7210	-6118	-6752	-6607	-6866	-5998	4461	1549	63
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46	-940	-4092	196	-331	-4412	-3593	-2252	-1675	1546	-4107	-3181	1061	-1010	2327	653	-349	-2558	-915	1561	1599	64
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-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
47	-3634	-5231	826	-129	-757	3120	-3144	-5311	-434	-5236	-4372	905	-4479	-2731	-3537	-788	-1041	-4841	-5412	-4633	65
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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48	-1108	-2725	-5245	-4610	-1161	-4452	-3325	3058	-4207	705	-384	-852	-4500	-3831	-334	-1907	-2841	1462	-3190	-2848	66
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49	1260	-2803	-1772	-3941	-2771	-1277	-3144	2217	-3664	539	730	-1442	-4369	-3405	-1052	-1332	1925	-2225	-3248	-2886	67
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
50	-597	-4092	1714	1104	-4413	-3593	-2252	-4164	197	-494	-694	1507	-3686	1818	-122	659	-916	-3714	-4276	-3593	68
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
51	-886	-4102	-1336	653	-4423	-1236	1004	-4174	3069	-4117	-3191	545	-3694	291	394	-607	-2567	-3724	-4284	-3602	69
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 4/32

52	78	2795	-428	-4242	-2710	-4369	145	695	-1076	2295	273	-3894	-4423	-49	-3835	-1877	-2804	-2167	866	-2850	70
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
53	117	-4092	2782	545	-4413	-1720	-2252	-1864	-912	-4108	-3181	840	699	-97	-851	-593	40	-714	-4275	-3593	71
-	-150	-502	240	43	-383	401	103	-629	210	-468	-713	275	393	46	95	360	119	-372	-297	-252	
-	-583	-1590	-11527	-327	-2304	-701	-1378	*	*												
54	-2739	-3261	702	-1552	-1049	-1425	-591	-994	-2540	-1492	-2430	-1139	-4014	-872	-2913	-1575	-171	-1236	-3633	4195	74
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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55	-6061	-5426	-8423	-7836	174	-8240	-6742	2396	-7642	2680	-2238	-7944	-7194	-6330	-7081	-7629	-5889	-1773	897	-5384	75
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
56	917	-4094	-2468	-714	-4414	570	830	-4164	2745	-4109	-3183	74	-3689	929	-2342	-1596	52	-1108	-4277	-3595	76
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
57	-680	-4095	1980	794	-4416	741	-2254	-4167	145	-4111	-3184	1061	1224	435	-1051	378	-386	-3717	-4278	-3595	77
-	-150	-501	234	42	-381	399	110	-627	211	-467	-721	279	393	44	95	360	118	-370	-295	-250	
-	-31	-5599	-11527	-2807	-223	-701	-1378	*	*												
58	942	-2775	-1042	-4088	-2738	-4341	560	891	225	2098	2191	-1246	-4397	-3501	-3763	-3401	-1516	-2194	863	-2867	86
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
59	-4606	-5401	-3869	-4255	-7234	3748	-5181	-7338	-5436	-7311	-6605	-1046	-5670	-140	-5877	-4650	-4961	-6340	-7108	-6696	87
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
60	-1029	-2769	-5299	-1394	1996	-4510	-3389	2081	-4267	-2606	-132	-4156	-4557	-3893	-4070	-3598	-472	2155	-3252	2078	88
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
61	-239	-4233	1152	-2113	-4626	555	-2487	-4376	-694	-4333	-466	1252	-3879	-2038	-2610	-250	2930	-3919	-4510	-3828	89
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
62	2623	-2941	-4036	-3461	-2940	1140	1204	-2494	-3255	-2818	176	-3423	-4268	-533	-3437	-520	-151	348	-3379	69	90
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
63	-4777	-4256	-7476	-7167	-4920	-7349	-7445	3081	-7153	141	-3597	-7004	-7060	-7112	-7338	-6742	-170	2423	-6741	-6228	91
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
64	-6746	-5975	-6657	-528	-2190	-7063	-3585	-5892	-6009	-1756	-5291	-5711	-7002	1984	-5787	-6378	-6602	-6021	5623	2050	92
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
65	-5029	-4582	-7496	-6959	122	-7061	-6044	2298	-6715	2037	1608	-6732	-6641	-6001	-6450	-6294	-217	1290	-5182	-5137	93
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
66	-1269	1372	-5290	-4848	-4047	-4330	-4173	-3617	-4592	-1531	783	233	1518	-4323	-4625	2681	1511	-3381	-4485	-4145	94
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 5/32

67	-1240	-4199	-5920	-6230	-6753	-4440	-5862	-6474	-6122	-6774	-5889	-5051	4130	509	-5963	-3825	-4047	-1240	-6953	-6836	95
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
68	108	-4065	-7124	-6741	434	-6661	-6322	2424	-6592	-3617	-3454	-6403	2571	-6423	-6620	-5945	-4483	1900	-5951	-5492	96
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
69	-1405	-2708	-5187	-4553	2792	-4420	-3289	-775	-4156	-639	-1911	1332	-4470	618	-3968	-303	-28	526	1665	2169	97
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
70	-662	-4092	1024	2245	-4413	-3593	326	-4164	1661	-2213	-44	-601	-352	799	-152	-1385	-537	-1818	-4276	-3593	98
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1356	-10485	-717	-894	-1115	-701	-1378	*	*												
71	-1559	1519	384	-879	-3251	-285	1083	-2981	-803	-2964	-2060	2667	-2633	2129	-1307	-1453	323	-183	-3163	-2498	99
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-188	-9133	-3052	-894	-1115	-4835	-51	*	*												
72	-1792	-1625	-3998	-3375	867	-3348	-2215	1966	893	1010	-718	-2943	-3380	1633	-2846	-2432	-1732	1248	-2099	-1765	100
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-91	-8949	-4075	-894	-1115	-4936	-48	*	*												
73	-1348	-2799	452	558	-238	-2321	1570	-2855	-570	-2811	-1891	1536	1707	-527	-1076	949	-90	-2416	-2988	1085	101
-	-147	-501	237	42	-382	399	104	-628	209	-467	-722	276	392	46	94	362	120	-371	-296	-251	
-	-4027	-346	-2721	-162	-3232	-4977	-47	*	*												
74	-1398	-1247	-3568	-2947	-1199	-2933	-1800	360	-2581	643	-435	2323	-2982	-2239	-2446	-2013	1170	862	3508	-1367	104
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8627	-9669	-894	-1115	-1469	-647	*	*												
75	-455	-2991	765	-1354	-3181	663	2621	-186	-1258	-2950	164	570	-190	-1204	-1733	489	1132	402	-3260	-2668	105
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9564	-10606	-894	-1115	-2824	-220	*	*												
76	1379	-3225	-70	-1368	-3461	700	-1655	437	-421	-1745	-2338	952	-899	334	-1766	-396	-801	1437	-3462	-2835	106
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9692	-10734	-894	-1115	-45	-5023	*	*												
77	448	-3860	-1339	-2058	-4084	78	-2337	-3769	-740	-3834	67	-2348	-3755	969	-2452	2571	-322	-28	-4106	1105	107
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
78	-1625	-4050	-839	-1940	-4352	1882	547	-1615	-903	-1959	-3144	-540	2730	248	-2358	-326	170	-1532	-4245	-3574	108
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-305	-10485	-2397	-894	-1115	-701	-1378	*	*												
79	-1428	-3831	469	208	-4152	596	99	-3903	-325	-1529	1961	1724	-888	1738	-2079	479	-568	-3453	-4014	648	109
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1921	-10182	-444	-894	-1115	-3323	-152	*	*												
80	372	-2330	-897	-354	-2616	-1985	1916	-2329	2146	-2336	-1448	798	-2082	-215	-725	692	-940	578	-2554	-1910	110
-	-150	-501	239	44	-377	400	104	-628	209	-467	-722	274	396	44	95	359	116	-371	-296	-251	
-	-2157	-369	-9309	-557	-1643	-3400	-144	*	*												
81	1078	-2294	1350	-648	300	-485	-900	-2151	-553	-2254	1556	1037	572	-499	-1029	66	-1123	-1846	-2562	1044	114
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-6	-8597	-9639	-894	-1115	-2793	-225	*	*												

Table 4, Sheet 6/32

82	-1461	-2933	984	-749	-3253	-139	1474	-3003	-675	-2949	-2024	1555	-2523	717	848	1813	-1401	-2555	-3117	586	115
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9004	-10046	-894	-1115	-1884	-456	*	*												
83	57	-3035	-1842	31	-3246	-482	-1560	-2923	-1198	-3004	861	669	892	1771	-1680	-1806	1403	888	-3289	1312	116
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9540	-10582	-894	-1115	-40	-5194	*	*												
84	873	-4137	291	-1124	-4446	1513	-306	-4191	-1910	-4148	-3231	-436	-3744	-845	-2419	1681	-2625	-971	3835	-3646	117
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
85	-4176	-4768	1829	-3445	-3695	-1300	-3742	-4659	-4308	-4801	-4205	894	-5163	-3872	-4784	-4205	-1573	-1321	3566	3879	118
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
86	-1132	-3799	-861	118	612	-712	4033	-3673	-2003	-1593	1397	819	-3773	-477	-2483	-2604	327	-3356	1896	-377	119
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
87	-1015	-4079	-928	-1940	-4392	2727	230	-4135	1129	-1785	-3172	-2248	340	-1811	835	-221	-2571	-1529	-4268	-3593	120
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
88	-7416	-6752	-7795	-8171	-4839	-302	-5966	-8217	-8274	-7590	-7577	-7492	-7408	-7730	-7762	-7573	-7664	-8017	-5332	4874	121
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
89	-4666	-5065	3020	-4360	-296	-5588	143	-4906	-4122	-4709	233	-4314	-5620	2387	-291	-4603	-4588	-4791	3763	68	122
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
90	-285	-2705	-5216	-4581	-2659	-1500	-3296	1800	-4177	411	509	-4068	1915	-1144	-3980	-3509	1879	303	1008	-2821	123
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
91	482	-3709	-2718	364	-791	-3717	285	-761	-549	-1726	-2840	-2438	-3805	801	1137	431	1253	665	-3990	1751	124
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
92	-4889	-6628	3602	-2998	-7225	-4711	-4283	-7248	-4767	-7097	-6541	1976	-5333	-3990	-5802	1074	-5057	-6580	-7280	-6167	125
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
93	-7029	-5996	-7530	-7846	2273	-7404	-3629	-269	-7412	804	-4944	-6040	-7227	-6136	-6780	-6653	-6877	-5902	2046	4054	126
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
94	-2620	1093	-168	384	997	-129	-2255	-4144	1727	-4095	-563	290	-3689	-278	687	-2503	688	-1293	-4268	2168	127
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-21	-10485	-6218	-894	-1115	-701	-1378	*	*												
95	371	-4076	-317	1265	-4397	-1729	212	406	1377	7	-3165	586	-3669	1009	-234	493	-1214	-3698	-4259	-3576	128
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-63	-10466	-4571	-894	-1115	-1141	-872	*	*												
96	-843	191	-1277	-1657	1107	-438	-3165	2635	-3896	-389	-1867	-690	-235	-947	-3795	-3381	-212	1299	-3119	-2770	129
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3167	-10404	-172	-894	-1115	-2010	-412	*	*												

Table 4, Sheet 7/32

97	-1053	-2634	-1898	158	-2897	-1582	2013	-2699	-340	-2629	-1777	2478	-1882	1472	-923	-857	-1032	-2240	-2803	-2027	130
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-320	-7252	-2377	-894	-1115	-5364	-35	*	*												
98	-2259	-2673	-1597	-1655	-2974	-2426	-1778	-3343	-1247	-3149	-2741	-1799	-2844	4302	-1363	-2273	-2358	-3074	-2844	-2538	131
-	-149	-500	233	43	-381	398	105	-627	216	-466	-721	275	393	45	96	359	117	-370	-295	-250	
-	-2113	-387	-7991	-68	-4439	-5394	-35	*	*												
99	-2307	-2447	-3004	-3307	-4059	3719	-3189	-4433	-3631	-4384	-3905	-3019	-3114	-3435	-3496	-2545	-2690	-3694	-3457	-3941	133
-	-149	-500	233	43	-381	398	105	-627	210	-466	-721	275	393	45	96	360	121	-370	-295	-250	
-	-2113	-387	-7991	-68	-4439	-5394	-35	*	*												
100	-1622	-1179	-4160	-3786	-1612	-3872	-3506	2486	-3640	-485	-405	-3542	-3714	-3484	-3705	-3175	-1613	2883	-3068	-2632	135
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-17	-6949	-7991	-894	-1115	-343	-2240	*	*												
101	-2365	-3834	2901	-520	-4154	-3339	974	-3903	-1579	-3850	-204	1923	-753	415	106	-2246	-987	-3455	1778	207	136
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10186	-11228	-894	-1115	-94	-3985	*	*												
102	-1119	-4113	-534	989	-4433	180	-2271	-4184	-1854	-4129	-3203	-909	2651	-1812	111	685	1324	-3735	-4297	-399	137
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
103	-1031	-4076	-2475	234	131	-1570	2594	278	1057	-2352	-611	693	-914	1077	1767	-2504	-327	-3694	-4264	-398	138
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
104	-3766	-3535	-5916	-5401	2942	-840	-3425	-3059	-4991	656	248	-4706	-5245	-4509	-1239	-972	-3702	-2996	1011	3458	139
-	-143	-501	232	42	-382	399	105	-627	212	-467	-721	277	393	44	95	358	116	-370	-295	-245	
-	-42	-5149	-11527	-2670	-247	-701	-1378	*	*												
105	-8252	-7162	-8163	-8550	-8738	3865	-7830	-9779	-8750	-9145	-9067	-8451	-7614	-8612	-8185	-8693	-8516	-9303	-7448	-8752	147
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
106	-3611	276	1704	-4311	-6496	-1350	-4820	-6315	-4922	-6428	-5526	2043	-793	-4557	-5305	512	2942	-5291	-6593	-6141	148
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
107	-503	-4051	8	1036	-574	-2005	-2265	-1878	1377	260	2254	832	-3697	-1811	1077	-1552	93	-3663	737	-3574	149
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
108	1612	-4106	1904	1843	-4427	-858	-2263	-4178	-659	-4122	-695	-1031	-3697	1321	-2354	-197	-943	-3728	-4289	-3606	150
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
109	11	-4538	3047	1602	-4847	-3855	-2619	-4610	-288	-1877	-3642	-2482	-4021	1329	-2794	-2886	267	-4156	-4718	-4008	151
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
110	-2036	1220	-7421	-6835	3516	-6860	-5376	-2914	-6508	2094	660	-6481	-6457	-5667	-6141	-6041	-5012	-3551	403	-4244	152
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
111	-851	-4088	921	828	349	-3602	-2260	-604	2159	-989	-3179	-2240	-3695	1839	1456	-2510	-2566	-3708	-4273	-3595	153
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 8/32

112	564	-4093	406	1072	-4414	-3593	231	-4165	466	-4109	-3182	1180	-3687	1276	947	1015	790	-3715	-4276	-3593	154
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
113	251	-5382	-8381	-7805	-3477	-8030	-6821	-2909	-7602	2757	3310	-7863	-7137	-6322	-7056	-7412	-5820	-1221	-5316	-5560	155
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
114	-305	1484	-5265	-4631	-2702	-4472	-3348	2502	-4229	-612	1448	-4118	-4520	-3853	-1047	-966	-987	2286	-3212	-2869	156
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-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
115	884	-4092	1870	-634	-4414	-786	843	-4164	304	-4108	-3182	505	-3686	896	434	1104	225	-1701	-4276	-3593	157
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
116	1572	-4092	-316	1390	-4413	-3593	-2252	-4164	1260	-1864	-3181	-565	-3686	-20	1256	-11	240	-709	-4275	-3593	158
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
117	2346	3387	-5358	-4725	741	-4568	-3442	-753	-4323	731	1479	-4215	-4607	-3938	-4122	-3656	-120	-1125	-3290	-2956	159
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
118	-2653	-4128	-124	-729	-778	-1262	4466	-4200	1226	-4143	-3218	354	-3715	446	-370	-1338	-2593	-3750	-4310	-3626	160
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
119	1456	-4094	122	1669	-4415	-398	-2253	-4166	901	-4110	-462	905	-3687	1166	-743	607	-2560	-3716	-4277	-3594	161
-	-149	-500	235	43	-381	398	105	-626	210	-466	-721	275	396	45	96	359	117	-369	-295	-250	
-	-35	-5386	-11527	-985	-1015	-701	-1378	*	*												
120	905	-3975	-3344	-2721	-4151	-4168	-455	-3757	1571	72	-3119	1224	-4233	-2376	2466	-3147	-3042	-301	-4211	1099	164
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
121	-4722	-6205	1052	-3086	-7197	3376	-4350	-7191	-4837	-7077	-6482	1612	-5315	-4063	-5831	-2007	-4937	-6437	-7269	-6213	165
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
122	-4922	-4389	-7600	-7267	-4589	-7480	-7387	3162	-7240	-1180	3054	-7139	-7096	-6988	-7325	-6879	-4901	1873	-6437	-6132	166
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
123	362	-4119	-1060	-1952	-4444	-3625	-196	-4190	3130	-1561	-3209	-437	-3717	274	1372	-1594	-2591	-3743	-4297	-879	167
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
124	-2157	1226	-6830	-6365	-616	-6361	-5646	2243	-6139	479	-3205	-6010	-6258	-5902	-6093	-5571	-1543	2891	-5359	-4952	168
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
125	-4973	-4556	-7390	-6825	-605	-6889	-5739	2833	-6544	187	2572	-6548	-6505	-5815	-6253	-6091	-4885	927	-4941	2516	169
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
126	790	-2711	-5231	-4595	719	-745	-3305	-173	-4190	1545	2374	-4079	-4482	-3812	-3990	-3518	-868	1788	-3169	-178	170
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 9/32

127	-8466	-7310	4232	-7396	-8700	-7098	-7495	-9750	-8307	-9096	-9042	-7636	-7557	-7951	-8076	-8688	-8607	-9400	-7444	-8581	171
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
128	1130	-2705	-5224	-4588	2004	-410	-3297	574	-4183	665	-213	-4072	-4476	-3806	-3983	-1769	-1213	2047	-3163	-324	172
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
129	-202	-4206	-7392	-7072	-4907	-7157	-7171	-452	-7025	-944	-3609	-6853	-6944	-6970	-7177	-6521	-1808	3649	-6601	-6084	173
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
130	-1570	-2728	-5251	-4616	2039	-4455	-3328	1709	-4212	-885	909	-4101	2203	-3835	-4013	-3541	-400	1465	-3192	427	174
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
131	-8077	-7138	-7637	-8023	-8516	-7075	-7642	-9658	-8487	-9057	-8951	4459	-7552	-8282	-8070	-8424	-8336	-9174	-7395	-8424	175
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
132	-8777	-7286	-8125	-8503	-8089	-7246	5476	-9783	-8678	-9076	-9078	-8509	-7683	-8576	-8145	-9272	-8931	-9493	-7256	-7887	176
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-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
133	-2889	2001	-4429	-3820	-2867	-4315	-3121	-831	117	-2749	3125	-3660	-4375	-3300	55	996	2538	-2318	-3326	-30	177
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-82	-10485	-4194	-894	-1115	-701	-1378	*	*												
134	1475	-4014	-6380	-6508	-6579	1671	-5822	-6377	-6284	-6626	96	230	-5088	-5833	-6089	2399	828	-5159	-6797	-6703	178
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10404	-11446	-894	-1115	-243	-2687	*	*												
135	293	1078	1810	-245	-4380	493	-2259	-4123	-1843	-4081	-3161	-505	954	-1802	-643	621	742	-1825	140	1492	179
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
136	1323	-4092	1113	1711	450	746	-2252	-4164	-625	-4108	-3181	366	-3686	-7	-903	74	-1029	-1325	-4275	-3593	180
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
137	-1452	-108	1337	-1115	89	609	3017	-4133	-691	-2342	-3166	437	-3690	385	-2346	1029	-91	-1321	-4263	560	181
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-82	-10485	-4194	-894	-1115	-701	-1378	*	*												
138	1341	-3956	208	1481	-1210	685	-2203	-907	-923	-1650	-3053	-846	1318	-1753	-1129	-287	-699	-799	949	-3493	182
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-167	-10404	-3204	-894	-1115	-2010	-412	*	*												
139	459	-3868	-497	-1713	-4183	180	-2044	-3930	216	-3882	-2959	356	-480	-1587	-864	-328	887	-3487	4543	1218	183
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1744	-10239	-513	-894	-1115	-3097	-179	*	*												
140	50	-2754	884	2171	-3064	1269	-892	-2816	-510	-2766	-1855	-805	-2307	-443	864	-1150	-1225	-2372	-2942	750	184
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-475	-8501	-1848	-894	-1115	-5116	-42	*	*												
141	1353	-2588	1260	1130	-2871	-1952	-748	-2615	-426	-2593	2728	1416	-2136	-318	-960	-1014	-1103	-2193	-2795	-2097	185
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-8	-8034	-9077	-894	-1115	-5240	-39	*	*												

Table 4, Sheet 10/32

142	-863	-2043	-1060	-277	-2257	309	-555
-	-149	-502	232	43	-379	399	103
-	-3199	-370	-3094	-1784	-495	-825	-1200
143	491	-2153	235	-3609	3508	-3761	-2613
-	-149	-500	233	43	-381	399	106
-	-2	-9798	-10840	-894	-1115	-1601	-577
144	-258	-3708	906	-613	-448	-3216	-1875
-	-149	-500	233	43	-381	399	106
-	-2	-10042	-11084	-894	-1115	-2093	-385
145	-375	-3789	737	1980	-4108	-251	-1951
-	-149	-500	233	43	-381	399	106
-	-2	-10133	-11175	-894	-1115	-1106	-901
146	480	-2632	527	-3784	-431	222	279
-	-149	-500	233	43	-381	399	106
-	-2	-10298	-11340	-894	-1115	-135	-3484
147	66	-3328	-871	-911	814	289	-299
-	-149	-500	233	43	-381	399	106
-	-1	-10485	-11527	-894	-1115	-701	-1378
148	735	-4092	-1124	486	-4413	652	-236
-	-149	-500	233	43	-381	399	106
-	-201	-10485	-2953	-894	-1115	-701	-1378
149	-456	-3914	1012	1114	-706	-460	-49
-	-149	-500	233	43	-381	399	106
-	-2	-10286	-11328	-894	-1115	-307	-2384
150	606	-4057	257	-1902	-429	1035	-2233
-	-149	-500	233	43	-381	399	106
-	-2	-10459	-11501	-894	-1115	-1265	-776
151	-673	-34	1484	597	-1161	1273	-2230
-	-149	-500	233	43	-381	399	106
-	-446	-10459	-1915	-894	-1115	-1265	-776
152	199	-3692	162	-47	-4013	-384	-1851
-	-149	-500	233	43	-381	399	106
-	-105	-10015	-3849	-894	-1115	-3799	-108
153	-2161	-3339	-2140	-79	588	382	-1859
-	-149	-500	233	43	-381	399	106
-	-1289	-9912	-762	-894	-1115	-4011	-92
154	356	-1278	-3028	1286	1786	-2793	-1624
-	-149	-500	233	43	-381	399	106
-	-135	-8629	-3521	-894	-1115	-5073	-44
155	414	-1974	2293	-781	775	-2242	-940
-	-149	-500	233	43	-381	399	106
-	-6	-8499	-9542	-894	-1115	-550	-1657
156	-2293	-3722	-466	40	-4025	-3274	-1934
-	-149	-500	233	43	-381	399	106
-	-2	-10099	-11141	-894	-1115	-225	-2793

640	1106	-2011	-1164	-564	-1971	1549	-670	-805	-803	1220	-2296	-1686	186
-629	210	-462	-723	273	391	46	97	359	117	-372	-297	-231	
*	*												
-133	-3285	-666	-1354	-185	-3816	-2979	-3220	-417	-141	-259	-2606	-2253	195
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
93	973	-3723	-2798	436	-770	2002	-91	459	-72	225	-3893	21	196
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*	*												
-293	784	-3804	-2878	-1928	1280	-1492	1139	-219	-2257	-688	-3973	-3291	197
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
180	-3505	-2487	-1830	-3562	-4203	-3244	-3529	1858	622	1238	-3077	885	198
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-672	-1401	-140	-2491	1631	-3976	-2359	959	-2853	603	454	215	1373	199
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-4164	1639	-1722	628	-242	-297	265	-727	1141	-898	-1243	-4275	-3593	200
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-3982	857	-788	-3004	1137	-711	-1622	-2170	1401	-2387	-486	-4099	-6	201
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-1749	1549	-1180	-3148	924	-639	-614	-1007	699	-297	-3676	-4244	763	202
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-4136	447	-1755	-3156	-5	-3665	-1771	1407	-320	48	-3688	-4251	1094	203
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-3764	-225	-1337	-2781	2037	1163	852	-174	975	231	-3314	-3875	-3192	204
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-3229	631	-369	-110	-1876	1995	979	-841	336	247	-452	-3592	151	205
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
727	-2150	-1132	-476	-2208	-2850	-1890	505	-1846	-1269	1038	-1721	1996	206
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-179	-674	-1901	-1123	861	-2327	-605	819	-1181	70	-6	-2296	-1766	207
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-10	877	-1250	-2816	1348	-3366	104	-2026	135	63	-3334	1226	3252	208
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
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Table 4, Sheet 11/32

157 =	71	-4062	527	-350	-4383	1922	-2221
-	-149	-500	233	43	-381	399	106
-	-2	-10448	-11490	-894	-1115	-375	-2128
158	-360	-4089	2756	-254	-716	-1508	-2253
-	-149	-500	233	43	-381	399	106
-	-71	-10485	-4400	-894	-1115	-701	-1378
159	-2856	579	-1074	-4338	1305	-253	-623
-	-149	-500	233	43	-381	399	106
-	-40	-10415	-5247	-894	-1115	-1890	-454
160	-540	1605	-1061	-671	939	-3507	288
-	-149	-500	233	43	-381	399	106
-	-2	-10377	-11419	-894	-1115	-2264	-337
161	-1573	581	693	-3797	960	-1395	1129
-	-149	-500	233	43	-381	399	106
-	-2181	-10377	-361	-894	-1115	-2264	-337
162	591	-2360	-791	1402	867	352	-568
-	-144	-500	232	44	-381	399	105
-	-3368	-539	-2219	-33	-5471	-1006	-994
163	-3247	-3172	-5235	-4382	-2478	-573	-3019
-	-150	-501	234	42	-375	397	110
-	-397	-2618	-3688	-1648	-554	-2653	-250
164	-660	-3339	-426	-1266	2742	387	1304
-	-149	-500	233	43	-381	399	106
-	-288	-9660	-2475	-894	-1115	-1807	-485
165	-2004	-3480	1563	403	-76	-2959	1157
-	-149	-500	233	43	-381	399	106
-	-3	-9688	-10730	-894	-1115	-3554	-128
166	-569	-3357	-1920	-293	-3638	2536	-1680
-	-149	-500	233	43	-381	399	106
-	-606	-9729	-1549	-894	-1115	-4297	-75
167	-1580	-2399	277	-1234	-82	-690	-1385
-	-149	-500	233	43	-381	399	106
-	-426	-9127	-1978	-894	-1115	-4838	-51
168	-1289	-1986	496	-1044	-2072	665	2322
-	-149	-500	233	43	-381	399	106
-	-285	-8707	-2500	-894	-1115	-5043	-44
169	-1243	-2465	528	-585	-2734	991	-943
-	-149	-500	233	43	-376	400	105
-	-554	-2243	-3213	-87	-4100	-5139	-42
170	-1042	-2476	1476	677	476	-1980	-672
-	-147	-501	234	47	-377	399	105
-	-1964	-430	-9308	-29	-5634	-2593	-262
171	-1350	-2795	-1208	579	-3104	-2328	1428
-	-149	-500	233	43	-381	399	106
-	-163	-8878	-3259	-894	-1115	-1580	-587

-4134	492	-4078	-3151	-972	457	-11	1582	374	-343	-3684	-4245	-3562	209
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-244	546	-4104	-3178	894	-3687	1057	-2341	-152	-92	-1229	-4273	-3591	210
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
496	-404	-2566	-1920	-3930	-4423	-3647	-3866	-3446	-1205	-2136	3651	3644	211
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-4021	-85	-3982	48	107	-940	1070	-131	-716	374	-1763	392	3076	212
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
2092	-3527	-400	-1911	610	-839	-716	-3570	467	-877	-22	-3157	799	213
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-2402	1092	-2368	-1454	-551	505	-114	1041	-819	-870	-1974	-2552	-1882	214
-627	210	-467	-721	275	393	48	95	358	117	-370	-295	-250	
*	*												
-722	-2773	-91	-2102	-3944	-4583	-3265	811	-3721	-3190	-2563	5731	-2477	216
-628	209	-467	-722	274	392	44	102	358	124	-371	-296	-246	
*	*												
-3361	932	-1045	-2437	-1571	-720	-1136	1608	-579	-1878	-2946	-3540	-2876	221
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-3551	141	-3496	-2571	-230	2752	890	-1730	-1881	209	-3102	-3663	-2978	222
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
736	-200	-3361	-2471	-1673	1374	-1239	-101	-749	-197	-2961	-3580	-2933	223
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-367	1980	-2323	-1548	-1474	-2771	-1054	1463	326	-1519	559	2038	396	224
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
17	295	441	-1144	-1261	-2512	-848	266	-18	-1228	-39	1726	583	225
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												
-2438	-611	-2497	-1644	1424	-2322	-531	-1111	1631	-1202	-44	-2759	1930	226
-626	210	-466	-721	275	394	45	96	359	117	-369	-295	-250	
*	*												
-2514	-280	-2483	-1575	2156	304	-223	-792	578	-984	-2086	-2670	878	228
-627	210	-467	-721	276	393	44	95	358	116	-370	-295	-250	
*	*												
708	253	-2806	-1887	385	1812	1242	-1078	-146	735	-2411	-2985	934	230
-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
*	*												

Table 4, Sheet 12/32

172	545	-3282	-343	277	-3601	2235	-1448	-342	-123	-1030	-2372	209	-2882	1554	84	-1696	-1754	-2903	-3467	-2785	231
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9510	-10552	-894	-1115	-729	-1333	*	*												
173	274	-3822	826	-190	-796	1173	-1982	-3893	86	-3838	-2911	2270	-1235	-364	-2070	-54	776	-604	-4005	-3323	232
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10171	-11213	-894	-1115	-804	-1227	*	*												
174	-2513	1292	212	-964	108	58	-204	-3970	-813	425	-3029	68	1475	-215	510	-1474	182	-1248	-4130	2118	233
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-543	-1673	*	*												
175	-416	-4012	932	231	959	-3576	662	72	-267	-909	-440	-720	-3669	396	-221	602	685	-1669	-4209	1883	234
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10450	-11492	-894	-1115	-382	-2104	*	*												
176	-1215	-4092	757	-28	-512	-1236	1865	-4163	-668	-4107	-3181	1312	1610	717	-2340	1339	-277	-721	297	-3592	235
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
177	87	-451	1936	-199	-4411	-955	-2252	-1208	293	-2357	-3180	-74	2452	-319	-161	-313	-2558	-3713	845	-3592	236
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-72	-10485	-4386	-894	-1115	-701	-1378	*	*												
178	-145	1548	-3360	-2796	1809	-439	-2689	-2692	-218	-154	-2265	1208	-1550	-985	-2982	856	1668	-2547	481	-4	237
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10415	-11457	-894	-1115	-1898	-451	*	*												
179	-122	1368	1509	-1860	-4342	96	52	-265	-105	-4039	-3114	2707	94	-696	-349	-2440	-261	-3645	-4209	-203	238
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-42	-10415	-5163	-894	-1115	-1898	-451	*	*												
180	-2642	-3153	-1026	-1101	1324	-1900	32	-1152	677	-745	784	-410	-3922	-2357	-2825	-687	-2582	-2623	4896	1322	239
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10374	-11416	-894	-1115	-2289	-330	*	*												
181	-2526	290	89	488	-4278	1000	1233	922	665	-1018	-3062	1359	-3597	-1708	776	-30	-2465	-805	-4160	232	240
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-333	-10374	-2283	-894	-1115	-2289	-330	*	*												
182	-486	-3710	307	-1543	1206	240	1404	-3778	-220	-3725	-2800	-183	954	-233	-475	1714	-951	-3331	1938	-108	241
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1263	-10043	-780	-894	-1115	-3733	-113	*	*												
183	-1728	-2015	-2481	-1929	867	-374	3226	-1618	374	-113	-1203	1516	-3040	-1614	-2041	-1971	-1666	-1490	2626	1901	242
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1036	-8785	-971	-894	-1115	-5012	-45	*	*												
184	-1792	2872	-2132	-1434	-2813	-2585	3935	-2650	2194	-2624	-1910	-1481	-2710	-700	-125	-1793	-1706	-2378	-2606	-2177	243
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-10	-7758	-8800	-894	-1115	-5292	-37	*	*												
185	-1177	2374	-3256	-2703	3010	-2639	2355	-451	-2327	-789	-222	-2183	-2704	-1948	-2179	-1740	-1131	1288	-914	-197	244
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-10	-7758	-8800	-894	-1115	-3526	-131	*	*												
186	-1135	-2630	1948	-304	-2942	-1997	1333	-2701	768	-2643	-1732	1169	818	-289	-889	1444	-1083	-2249	-2813	-2111	245
-	-150	-501	232	43	-379	402	105	-627	210	-467	-711	274	393	44	95	360	118	-370	-295	-250	
-	-3365	-343	-3129	-29	-5656	-4371	-71	*	*												

Table 4, Sheet 13/32

187	71	-903	-3098	-2485	-875	30	-1413	2394	-2140	-763	-115	-2097	426	-1816	-2039	-1607	316	695	2758	-1021	247
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-8	-8161	-9204	-894	-1115	-774	-1269	*	*												
188	-1031	2075	760	69	17	-3494	1783	405	-184	366	-1824	-270	-3569	-2080	-2529	-255	-721	296	-3039	1888	248
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9900	-10942	-894	-1115	-1667	-545	*	*												
189	-2286	1049	-894	-184	2378	629	514	-3744	-593	-1488	-2803	1385	-3360	-360	377	-1247	34	-1479	2959	-3234	249
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10090	-11132	-894	-1115	-2048	-399	*	*												
190	-1217	811	2503	-2484	-2988	1605	-2436	221	-2347	-2837	-106	-2639	-3773	-2242	775	407	-339	-2411	1221	-2875	250
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10171	-11214	-894	-1115	-645	-1472	*	*												
191	-2536	-3936	188	534	-4226	2096	-119	1393	-938	-1731	-3033	462	-896	1150	-2278	-2430	-2475	-1263	881	426	251
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10381	-11423	-894	-1115	-558	-1640	*	*												
192	-675	-4067	-740	-205	-4387	-679	-2227	-4138	-571	-4083	-3156	998	988	-447	-2315	1892	1918	-1321	-4250	-413	252
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10456	-11498	-894	-1115	-414	-2003	*	*												
193	947	-4090	1608	-1919	-4410	-1328	-2252	-4160	-472	-2033	1183	1953	-126	1413	877	-571	-1387	-1544	-4274	-3592	253
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
194	-2997	-3142	-128	-3498	1171	-1186	-3014	-2699	-1015	-2999	-2334	-3482	-116	-3116	-337	-3351	-2936	-285	4853	2849	254
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
195	-2619	1393	-46	1043	-654	-353	946	-633	-686	-1611	-3178	1221	-3687	419	-500	1339	1105	-3710	-4273	-674	255
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-	-61	-10485	-4628	-894	-1115	-701	-1378	*	*												
196	-2602	-3745	2499	-2049	-644	-3634	-2309	-3617	-204	-2136	-2868	1352	-3723	-1902	84	-179	22	-1164	2619	2144	256
-	-149	-504	231	40	-371	404	105	-613	215	-470	-725	273	392	43	102	355	115	-373	-299	-247	
-	-2772	-2761	-502	-2375	-309	-1765	-503	*	*												
197	-1540	-2503	1918	-1033	-2697	1705	-1283	-2387	-937	-2524	-1733	-1285	-2656	-925	1509	-1533	-1505	251	3157	-2255	269
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8661	-9703	-894	-1115	-77	-4268	*	*												
198	23	1340	2073	-120	-843	-3569	888	-636	-151	-1214	-3123	1018	-3662	-1774	392	28	501	-3644	-4222	901	270
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10448	-11490	-894	-1115	-375	-2128	*	*												
199	-461	-290	619	1991	117	681	-2279	-4015	-1876	-4007	-433	551	-352	-289	-2376	-1119	342	-1236	2947	-768	271
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
200	-715	-4068	669	1304	678	-3599	297	-1256	241	-1157	-458	1822	-3692	787	-979	-1397	537	-1719	1920	-456	272
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
201	255	-3362	-3081	-2524	-3437	1545	-2591	-3036	-2404	-2096	-2524	-1211	-915	-494	1309	276	1032	1460	1107	-294	273
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-372	-10485	-2142	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 14/32

202	-1167	-3767	-1430	-92	-4085	1090	-1937	744	-370	-1505	-2857	-799	-3371	2171	-20	-727	-2242	-3387	2596	-82	274
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-296	-10115	-2438	-894	-1115	-3540	-130	*	*												
203	-923	-3533	351	1521	-174	-647	604	-3605	-128	-3549	-2622	1763	-3126	1841	-106	-427	903	-3155	-3716	-3033	275
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-756	-9821	-1297	-894	-1115	-2698	-241	*	*												
204	-1724	-2850	301	742	1449	-339	-1422	-2710	-1096	-624	-1979	399	-2828	-1027	-1580	-103	-1666	-2402	-3095	3340	276
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9215	-10257	-894	-1115	-2964	-198	*	*												
205	-468	1610	-19	-4425	2001	-4615	-2413	-2723	-4132	-2869	-2368	895	-4637	-3667	-4029	-3714	-3264	-2664	1981	3892	277
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-190	-9401	-3038	-894	-1115	-2877	-211	*	*												
206	-2272	-2368	-3736	-3458	-2327	1779	-2737	-2113	-3311	2182	-1785	133	-3786	-3050	-3320	-2695	807	-1983	-2837	1349	278
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-181	-9392	-3102	-894	-1115	-3606	-124	*	*												
207	-379	-3074	896	-979	-3371	379	3695	-3105	-894	-3080	-2170	989	-2735	-852	307	-1551	142	-2684	1764	545	279
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9296	-10338	-894	-1115	-653	-1458	*	*												
208	-98	2770	198	-891	-987	-15	429	-3536	-280	508	404	-2045	-758	1464	-285	-2285	18	-1520	-3845	1525	280
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10156	-11198	-894	-1115	-691	-1394	*	*												
209	-494	-3983	1162	689	2729	627	-2163	-4043	-1747	-3997	-3075	1162	-3596	-1705	-60	57	-512	-1245	-4172	-3493	281
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10369	-11411	-894	-1115	-655	-1454	*	*												
210	-190	-222	222	-1870	962	-1463	-307	-641	-1194	1539	311	-3876	-4392	-1052	-3814	-103	-586	456	1616	1529	282
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10445	-11487	-894	-1115	-1507	-626	*	*												
211	643	-3274	580	-1132	981	-423	-2591	-1324	992	-154	-2439	-659	-659	-2344	-2823	-138	-2632	1464	387	933	283
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10445	-11487	-894	-1115	-1507	-626	*	*												
212	-19	-4057	510	431	-699	1974	-2216	-4129	639	-4073	757	-564	-3651	16	176	1016	-699	-3679	-4240	-3558	284
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10445	-11487	-894	-1115	-1507	-626	*	*												
213	-355	-3235	-5099	-1194	-2927	-4831	-3651	-2497	-4185	2474	2254	-4298	-4853	2186	-4129	-3927	-3287	-2567	-3603	423	285
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10445	-11487	-894	-1115	-359	-2184	*	*												
214	1739	-3082	-182	-3038	-3102	-1439	-2838	-922	-2878	-1755	-2270	-3124	3169	-2744	-1266	-450	-2728	-1518	-3492	-302	286
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
215	-4651	464	3855	-3094	-6927	-4683	-4206	-6772	710	-6721	-6082	256	-5270	-3898	-4984	-4424	-4816	-1142	-6886	-5983	287
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
216	-5461	-4986	-7698	-7163	1022	-7248	-5463	1643	-6862	2782	-2327	-6796	-6720	-5898	-6445	-6466	-5335	-654	967	-980	288
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 15/32

217	-1455	-4071	2159	-1938	-4380	-1778	-2266	-1255	495	-4082	-440	3227	-3699	-1810	-517	-651	-2568	-3687	797	-3587	289
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
218	-2908	-2760	-5076	-4455	-19	-4433	2308	-2256	-4087	-71	-193	-4017	-955	885	-3946	-1878	2462	-2176	3158	2080	290
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
219	-858	-4092	844	2089	-4413	396	-2251	-1840	-158	-116	-3181	619	-3686	723	545	-490	-536	-3714	-4275	-264	291
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-86	-10485	-4122	-894	-1115	-701	-1378	*	*												
220	-2590	432	-492	-968	-4379	-3554	1588	-4127	-279	-4072	54	3577	-3651	-1757	-653	839	-2529	-3680	-4239	-3559	292
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10400	-11442	-894	-1115	-235	-2731	*	*												
221	-1507	-4130	30	874	-4450	300	-2284	-4201	-639	-4146	-3220	971	2711	-1826	-2379	-300	1292	-3751	880	-3629	293
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
222	260	-4092	726	1607	-4412	-513	-2252	-4163	92	-2472	-413	-306	-1618	771	-1255	-13	188	257	-4275	1832	294
-	-147	-502	234	43	-383	397	103	-625	209	-466	-723	280	393	43	93	360	116	-366	-281	-246	
-	-236	-3650	-3805	-2588	-262	-701	-1378	*	*												
223	-44	1317	-6066	-5505	1402	-5405	-4429	230	-5173	-839	-2606	-5054	-5394	-4849	-5031	-4538	-445	3184	-4243	-3877	304
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10378	-11420	-894	-1115	-623	-1511	*	*												
224	65	-2865	-4164	-3574	-2846	-4213	-3013	614	-1463	-2725	460	-3487	-4274	2287	2202	-714	-2751	1420	-3297	1201	305
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10450	-11492	-894	-1115	-384	-2097	*	*												
225	-651	-4093	1469	319	-4414	-125	-2252	-992	1025	-4109	-3182	1775	-3686	1796	695	210	-1255	-3715	-4276	-3593	306
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
226	338	-4091	-1137	2053	-4412	-1356	1269	-4162	366	-1668	113	354	-3686	679	408	-2500	-519	-587	-4275	1757	307
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
227	-1252	-2706	-1848	-4573	971	-4423	-3293	2094	-1151	939	2195	-273	-4473	-626	-3976	-3507	-1544	517	417	1633	308
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
228	806	-3111	-3504	-1085	-496	-4035	-2787	-228	1468	680	245	-1261	-1626	-1024	-237	-679	-463	149	-3509	2186	309
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
229	-60	-4091	2196	907	-4411	-1776	-2252	-1262	1126	-996	-3180	1611	-3686	-1792	309	-1480	88	-3713	-4275	-357	310
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-601	-10485	-1557	-894	-1115	-701	-1378	*	*												
230	130	-3300	320	1169	473	-864	-1863	-3174	-1511	-3265	-2425	-1883	-3276	-1457	-1991	670	-325	-2858	4062	2148	311
-	-147	-501	234	44	-381	398	111	-627	212	-467	-721	275	393	44	95	360	116	-370	-295	-250	
-	-116	-3705	-10929	-1545	-606	-55	-4734	*	*												
231	880	-2705	-5219	-1393	-497	-146	-3297	1273	-4179	1109	2050	-4070	-4475	-3803	-3981	-319	-956	1575	-3163	-2821	315
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 16/32

232	727	-57	-1515	-3685	-2832	-68	-3067	1080	799	359	1459	1063	-4314	-3227	-1673	-82	-1530	871	-3293	-301	316
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-25	-10485	-5900	-894	-1115	-701	-1378	*	*												
233	-345	-4072	1466	25	-4393	-131	1146	-4144	1820	-4088	-3161	77	-3665	415	805	-1371	-33	-3694	3083	-3572	317
-	-150	-501	234	42	-382	399	104	-628	209	-465	-722	274	395	44	97	358	121	-371	-296	-240	
-	-40	-5208	-11503	-3012	-191	-446	-1911	*	*												
234	-3098	557	-5412	-4796	2467	-4633	1098	-2384	-4390	1748	408	-4253	-4674	-3991	-113	-3721	-3037	-908	-3157	2811	327
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
235	-440	-2770	-4991	-4354	-2731	-4413	-3255	134	119	-429	-1971	-3962	-4464	-1018	73	-3489	-1348	621	5347	-2874	328
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
236	518	-2762	-8	-4162	-1014	-233	-3201	1185	-3847	1655	858	446	-4409	-1240	-1731	15	-797	-383	-3212	-256	329
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-352	-10485	-2213	-894	-1115	-701	-1378	*	*												
237	-2321	-3792	2018	1012	-4112	4	-1953	-3862	532	-740	381	1728	-3388	-1494	1351	-730	-2260	-3414	841	-3293	330
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-92	-10135	-4037	-894	-1115	-1267	-775	*	*												
238	-250	-3844	749	681	-4165	569	1082	-3915	1250	-2157	458	-1981	-495	607	655	-2252	491	-3466	1014	1304	331
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-500	-10197	-1775	-894	-1115	-3266	-158	*	*												
239	-2222	-2815	-28	-2116	41	3002	-2197	-2568	-2074	-2812	-2078	-563	-315	-1959	-2465	200	-2200	-465	1650	-2767	332
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2227	-9699	-349	-894	-1115	-4336	-73	*	*												
240	-690	-1030	-1347	667	-1112	1526	-775	-536	-770	-926	2421	-983	-2034	-651	-1069	-950	-658	1348	-1510	-1082	333
-	-149	-500	234	45	-381	398	105	-627	211	-465	-721	276	393	48	98	359	117	-370	-295	-250	
-	-2648	-650	-2300	-749	-1304	-3702	-115	*	*												
241	-1684	-3381	2298	2247	-3628	-1975	-1105	-3463	-1067	-3374	-2571	1229	-2376	-724	-1746	-1436	1284	-2978	-3559	-2700	336
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-265	-7722	-2618	-894	-1115	-1665	-547	*	*												
242	-498	-1527	-664	-3408	1644	-3248	-2119	1205	-3003	1436	1589	-2893	-3297	-2626	-2804	-2332	-1641	927	2073	992	337
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9095	-10137	-894	-1115	-3824	-106	*	*												
243	-241	-4561	1267	-1550	-5048	2995	-2504	-4899	-2536	-4814	-4030	545	-3695	1178	-3239	-874	-3044	-4358	-5001	-4130	338
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9182	-10224	-894	-1115	-89	-4060	*	*												
244	707	529	-5359	-4732	472	-4578	76	2402	-4335	-790	262	-4224	-4619	-3963	-4141	-3668	-2943	2418	-3322	-2979	339
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-36	-10450	-5378	-894	-1115	-1420	-675	*	*												
245	108	-5784	3750	-2898	-6561	-553	-3961	-6451	-304	-6372	-5641	-3250	-5036	-3629	-4889	-171	-4466	-5826	-6560	-844	340
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10415	-11458	-894	-1115	-267	-2564	*	*												
246	-882	-4791	-7040	-7394	-6930	3753	-6508	-7307	-7247	-7441	-6597	-5861	-5815	-6771	-6872	-4523	-4737	-6054	933	-6891	341
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 17/32

247	-6543	-5722	-7433	-7597	3802	-7222	-3668	494	-7173	255	-4495	-5988	-7055	-748	-6609	-6447	-6415	-5422	3771	92	342
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
248	-6705	-6597	-7597	-6711	-7409	-6618	-5618	-7674	-4419	-7152	33	-6439	-6902	-5393	4226	-6812	-6659	-7468	-6649	-6845	343
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
249	-5076	-4650	-7488	-6907	1609	-6991	-5853	2609	-1344	1676	2141	-6665	-6557	-5839	-6306	-6199	-4979	445	-4988	-4973	344
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
250	-7293	-7123	4192	-5905	-7868	-6589	-6618	-8745	-7289	-1940	-8114	-6217	-7106	-6709	-7576	-7234	-7475	-8427	-7251	-7548	345
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
251	2483	-2715	-5223	-4589	961	-4433	154	-752	-4186	-1198	-1919	-4078	-4484	-3812	-3990	-1105	1109	1651	-3176	-2833	346
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
252	2379	-2938	-5404	-2004	-2980	-1281	-3615	714	-4438	-2819	193	-4299	-4697	-4079	-4268	-903	-3050	2448	-3509	-3164	347
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
253	-2633	-4104	-1140	-1930	-4426	-1114	195	-4175	3070	-2035	-3193	1385	362	-1802	351	-251	-866	-3726	-4286	-3605	348
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
254	-2885	-2752	-4977	201	73	530	4521	-2250	-4009	-482	1252	-3962	-4455	-3677	-3896	-1731	-2826	-727	-3185	141	349
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
255	-2968	-2788	-5317	-4683	-582	-1479	-3399	2480	-4281	4	2830	-4171	-988	-3900	-4081	-3612	-2908	1493	-3254	1837	350
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
256	502	-4092	1261	-53	263	-72	-2252	-4163	-166	-4108	-3181	-601	1215	-609	-740	1631	-2558	-3714	1322	641	351
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
257	411	-4077	-106	1023	584	-3597	1678	-1191	1718	-390	8	262	1013	-704	-2346	-1133	-1329	-3696	-4265	-940	352
-	-150	-501	236	43	-379	398	108	-623	209	-468	-722	274	396	44	96	360	116	-366	-296	-251	
-	-5649	-1702	-572	-15	-6554	-701	-1378	*	*												
258	-411	1839	2192	748	-3114	-2333	-996	-2857	-582	-2816	-1898	-973	1512	1354	242	-1244	-1299	-445	-2995	-2319	354
-	-146	-506	264	43	-375	397	100	-637	194	-479	-736	283	414	28	89	355	113	-372	-288	-222	
-	-2874	-213	-9917	-4062	-89	-4972	-47	*	*												
259	-1416	-2774	1429	-736	-3035	-2386	1075	242	-666	-2768	-1878	2745	-111	-622	569	-1317	-1357	-2372	-2977	1327	382
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8875	-9917	-894	-1115	-3296	-155	*	*												
260	513	1170	-192	-1660	-2115	2157	-1598	778	-1527	-1967	-1252	1387	-2915	-1416	-1874	-1807	-99	-1536	-2462	897	383
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9078	-10121	-894	-1115	-85	-4123	*	*												
261	557	-4061	-56	474	-4382	1288	-175	-4132	-1802	-2004	-3150	-494	1458	382	-564	756	-301	-3683	796	988	384
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10450	-11492	-894	-1115	-384	-2097	*	*												

Table 4, Sheet 18/32

262	-1153	-2879	1150	-3594	2837	-1439	-292	319	-1519	-1069	-439	-1257	-4293	-3162	1061	-768	-1281	-807	2822	-274	385
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
263	122	-2720	-1621	-4453	-1028	-539	-3269	1036	-4078	1050	-1922	-802	-4456	1084	-3927	-838	-1339	403	3926	595	386
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
264	-233	-4093	-707	-1918	-4414	-3594	2926	-4165	1899	-4109	-3182	-744	114	1144	1484	-362	548	-1876	-4276	-3593	387
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
265	499	-4092	580	1661	-4413	-1745	436	708	417	-4108	-3181	205	-1007	934	-2339	753	-672	-258	-4275	-3593	388
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
266	-2891	-2717	-5233	-4599	3037	-4438	-3300	752	-4194	142	283	-889	-4487	-1135	-3994	-1378	-2832	-1132	3346	2415	389
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
267	-503	-3183	-1037	-1492	-3218	-3985	813	306	55	370	2307	-1113	-1033	-2549	1152	-2960	1259	340	884	892	390
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
268	-159	-4092	1289	912	-4413	-955	1047	-4164	313	-4108	-431	-380	-45	1806	-1132	850	246	-1172	-4276	-386	391
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
269	1274	-4093	1238	1709	-4414	-1956	1673	-4165	1186	-4109	-3182	745	-3686	-736	397	-1517	-2558	-1728	-4276	-674	392
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
270	407	-2709	-5213	-4578	-2664	-4428	-3299	1337	-4176	982	2698	-4069	-20	294	-3981	-61	-775	1488	-3168	-2826	393
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
271	85	-4092	262	-1918	-4414	199	975	-4164	1815	-4108	-3182	2049	361	-319	167	-1030	-407	-3714	-4276	1098	394
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-144	-10485	-3406	-894	-1115	-701	-1378	*	*												
272	1241	-3970	462	1296	-4291	-189	-2129	-4042	-267	-3986	-3059	1664	178	821	69	334	-577	-3592	-4153	-3470	395
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-284	-10342	-2489	-894	-1115	-2532	-274	*	*												
273	625	-2676	-1177	670	-171	85	-80	494	232	-329	-1859	-2778	-3779	-2399	-2817	-2704	1049	628	-3084	2108	396
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-226	-10060	-2793	-894	-1115	-3690	-116	*	*												
274	73	-2503	-1066	-2471	-21	-692	538	-115	1235	-326	890	829	-3575	-2174	-2598	443	794	938	-2908	-180	397
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-717	-9836	-1356	-894	-1115	-4142	-84	*	*												
275	-80	-2978	1132	1325	1194	-2498	-1158	-3038	794	122	-2069	-1136	-50	-700	870	-265	-98	-2597	-3166	-2487	398
-	-143	-506	231	44	-380	395	104	-628	221	-467	-713	277	393	41	93	356	114	-368	-264	-255	
-	-1944	-436	-10165	-1835	-475	-4841	-51	*	*												
276	-356	-2494	1117	-163	-2635	1340	-1339	-366	-1043	-2432	785	-1402	-2734	-980	-1496	1458	735	305	-2800	-2250	410
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9123	-10165	-894	-1115	-2882	-210	*	*												

Table 4, Sheet 19/32

277	-1905	-3358	239	-1142	-3665	1869	1510	-3416	-1072	-3364	-2456	-1452	597	1163	1325	-1780	-1846	-2980	-3528	2375	411
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9346	-10389	-894	-1115	-972	-1028	*	*												
278	-1093	-3703	369	430	-4024	-1118	890	-3775	1641	-3719	-2792	-1839	1981	426	570	691	-2169	-3325	-3886	896	412
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10028	-11070	-894	-1115	-950	-1052	*	*												
279	-976	-3912	1701	1575	-1111	505	-2074	-3981	326	-3927	-3001	430	1566	-1615	-2163	50	-2380	-1765	2039	-3413	413
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10276	-11318	-894	-1115	-124	-3599	*	*												
280	429	71	-1863	-1322	834	-1166	-3269	893	-4079	448	1507	-4006	129	-3728	692	-364	215	1285	-3175	-2830	414
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
281	-781	-2711	-348	-907	3229	-4417	185	-1048	-4136	-1108	2103	-4042	-774	-3771	-3958	-3498	-2816	-1046	990	2512	415
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-31	-10485	-5610	-894	-1115	-701	-1378	*	*												
282	-561	1323	-5196	-4560	109	-4398	-3270	1605	-4155	304	1757	-1446	-4448	-643	-3955	-1828	1924	1040	1341	-208	416
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10455	-11498	-894	-1115	-412	-2008	*	*												
283	-2959	-2779	-5308	-4674	2352	-4516	-3390	290	-1723	239	207	-4162	-4560	-3892	-4072	-3602	-218	2596	-3246	1386	417
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
284	968	-6618	158	-1335	-6920	3180	-4075	-6860	-4391	-2189	-6095	-3269	-5218	1419	-5293	-4432	-4868	-6301	-6934	-5886	418
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
285	-5864	-7026	-3549	3932	-7732	-5502	-5139	-8036	-5596	-7778	-7325	-1213	-6088	-4906	-6414	-5553	-6009	-7450	-7315	-6874	419
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
286	-242	-2704	-5221	-4585	-167	-4425	101	1435	-1866	-274	1375	-1502	-862	-3804	-3981	-3509	-1307	2210	2926	1326	420
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
287	-1781	-2711	-1661	-4530	1589	-1110	-349	1399	-4138	-298	-1913	-4043	-1510	-3772	-750	-532	-2816	-795	4640	1422	421
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
288	162	-4088	1418	-714	-4408	1367	2467	-1843	205	-758	-3178	-1104	-3687	1361	-2341	175	-841	-1726	-4273	-915	422
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2847	-10485	-217	-894	-1115	-701	-1378	*	*												
289	-732	-1200	-2291	-1892	-2006	1184	-1642	1572	-1739	-1880	-1160	-1621	-2261	-1561	-1945	1858	1564	-1213	-2374	-1999	423
-	-148	-503	235	42	-383	402	103	-627	211	-468	-718	278	395	44	93	358	115	-372	-297	-237	
-	-518	-1741	-8690	-3476	-136	-327	-2302	*	*												
290	588	-3859	1096	-225	-4178	1819	-2025	-3928	-1606	-1941	-166	712	-3459	1765	-1027	-635	580	-1514	-4044	-3362	436
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-86	-10220	-4136	-894	-1115	-3177	-169	*	*												
291	1059	-3794	1830	-152	-4111	1065	-1969	-3859	-1553	-1911	-2887	1208	141	-1511	-2060	518	446	-1623	-3983	-3302	437
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2561	-10136	-269	-894	-1115	-3476	-136	*	*												

Table 4, Sheet 20/32

292	2610	-1342	-2763	-2644	-3503	678	-2484	-3255	-2594	-3468	-2570	-1940	1729	-2326	-2723	888	-1095	-2280	-3694	-3427	438
-	-149	-500	232	43	-381	401	112	-627	210	-467	-721	277	393	46	95	359	117	-370	-295	-250	
-	-2750	-236	-8628	-41	-5171	-3546	-129	*	*												
293	136	-1631	-1527	-976	-1899	-2091	-1003	-1496	-753	473	-976	-1123	-2267	-730	2059	773	1741	-1268	-2155	-1683	440
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-8	-8080	-9122	-894	-1115	-68	-4437	*	*												
294	-1186	-4051	1864	-401	-4367	1750	1129	-4115	-1805	-1498	-531	719	-1394	238	-2311	105	645	-940	-4237	-642	441
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-164	-10448	-3225	-894	-1115	-375	-2128	*	*												
295	272	-3956	702	2234	-4277	227	-2115	-4027	-957	-1001	-3045	-3	557	-604	-561	575	-12	-3578	-4139	-3456	442
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-203	-10326	-2940	-894	-1115	-1827	-478	*	*												
296	611	-2883	-1048	-416	-2916	-1167	1492	-325	-2390	448	-2058	-2673	610	-2278	25	-2681	-266	512	2653	960	443
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10157	-11199	-894	-1115	-2297	-328	*	*												
297	801	1079	-172	312	-880	-3954	-2752	341	149	668	538	-3189	-4017	593	-3195	-416	-86	1089	-3087	43	444
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10204	-11246	-894	-1115	-1942	-435	*	*												
298	4	-3898	-149	88	-4219	-1463	-2058	-1582	892	-570	-2987	1038	-689	819	2246	21	-2365	-3520	981	-288	445
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10260	-11303	-894	-1115	-596	-1564	*	*												
299	-1397	-3038	-928	-2901	-504	1085	-2736	-1186	449	263	-2218	-3006	603	-867	-554	39	187	1072	2048	1040	446
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10415	-11457	-894	-1115	-267	-2567	*	*												
300	-1177	-3356	1832	-2532	-3429	237	-2595	-1214	-833	294	-293	-727	-137	844	-2813	-3	-2659	548	952	2051	447
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
301	1114	-4085	594	798	-654	-1917	-2254	-1463	282	-1404	452	-505	-766	1139	-304	-19	1081	-1324	-4271	-341	448
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-60	-10485	-4636	-894	-1115	-701	-1378	*	*												
302	-833	-4031	173	-1079	1188	-1064	-2204	-1235	-116	-4045	-3121	191	76	462	-1170	-203	439	-3650	963	3212	449
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10426	-11468	-894	-1115	-294	-2438	*	*												
303	433	-3984	420	767	-1222	-3624	176	-318	-1888	-905	-3086	906	728	486	104	-2535	1437	350	-4197	-350	450
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
304	328	1309	-281	-282	-4353	1769	1890	-649	-1024	-1741	-3145	1134	-3697	-1811	-765	556	-1304	-1729	-4245	852	451
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
305	-1216	-4032	-9	-1118	-745	942	-350	-1689	82	-1244	-3128	691	-136	-328	962	-2518	133	148	1628	2241	452
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
306	-136	-3415	-3012	-2457	1283	719	1555	-3109	-39	-867	1993	942	-900	-629	-2757	458	350	-1139	-3759	1213	453
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 21/32

307	819	-4092	1457	1573	-4413	-662	414	-1864	-1832	-2123	-3181	760	-1408	664	-1015	939	267	-3714	-4275	-3593	454
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
308	32	-2705	-5217	-4581	-906	41	-3295	-1012	-4178	1118	251	1098	-4474	-3801	-3979	460	-356	1357	2000	1529	455
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-71	-10485	-4400	-894	-1115	-701	-1378	*	*												
309	142	-4028	108	874	-4348	-1341	-2192	-1403	-611	-2296	157	1235	1056	1352	-2280	294	1338	-601	-4212	-3531	456
-	-150	-501	234	42	-382	398	105	-627	209	-467	-721	277	393	48	95	360	119	-368	-295	-245	
-	-1126	-2403	-1503	-26	-5804	-267	-2567	*	*												
310	-734	-2610	-2963	-495	1059	104	638	-322	-795	-1373	2904	-622	-3585	-2126	-392	916	69	-154	-3006	1234	458
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9894	-10936	-894	-1115	-3026	-189	*	*												
311	-694	-2235	-4645	-4015	-2191	1013	-2798	1221	-3631	1102	1518	-641	-3982	-3272	851	-1354	282	1211	-2692	-2347	459
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9944	-10986	-894	-1115	-617	-1523	*	*												
312	-1055	-2651	-613	-3810	3055	-4167	-3000	-40	-357	532	2046	142	-1479	-3268	-3551	-537	249	-2072	-3096	-75	460
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10321	-11363	-894	-1115	-149	-3351	*	*												
313	-467	-4167	2491	1181	-4487	-185	-2314	-4239	-1905	-4183	-3258	1531	-3743	456	-609	712	63	-3789	-4350	-3663	461
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
314	-1259	-2730	-148	-4608	3644	-4450	-3303	-537	-4204	-55	-1932	-851	-4499	-3826	-4005	-3535	-2845	1077	1010	672	462
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
315	-2622	-4063	394	-68	-350	-1402	503	-985	397	-162	-3155	-2242	1822	-427	553	536	286	-976	-4254	1241	463
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
316	-2746	-3224	1186	-2730	185	347	2505	-2850	-2594	1342	93	441	-4036	-2491	-1349	-1197	-6	-2691	-3603	1960	464
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
317	-203	-3318	-3142	-2584	2102	-381	1857	-1378	-11	-870	526	951	-3981	863	548	-279	-780	-1647	833	1040	465
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
318	216	-4079	1226	-6	883	984	-2256	-1835	141	-1227	-19	-2234	-136	269	384	-215	438	-3697	-4266	588	466
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
319	388	-3951	165	-986	573	-3634	-246	1134	885	-125	-3056	-396	-3725	158	-758	-9	727	662	-4172	-1068	467
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
320	346	551	529	-2498	-181	207	603	1285	-574	1197	-542	-1146	-3947	232	341	-1167	-2655	-2869	-3732	493	468
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
321	-41	-4088	-2468	-4	-4408	111	1186	-1261	400	-2211	-237	732	-883	1891	1097	-102	-291	-1544	-4273	1406	469
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 22/32

322	507	-4092	449	641	-4414	575	44	-4164	1050	-4108	-3181	1550	546	-720	-205	534	-202	-1228	-4276	-3593	470
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
323	1505	-2743	-4902	-1789	1303	-1982	-3231	-70	-3946	275	-1944	-363	129	-1121	-3855	20	400	1440	-3195	-283	471
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
324	-1181	-3995	572	-1044	2076	58	605	-1596	57	-562	-3095	-2274	-3713	478	213	1242	-1331	509	-4205	-1010	472
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-961	-10485	-1042	-894	-1115	-701	-1378	*	*												
325	54	-3258	916	-1144	-3561	794	-1470	532	-168	-1378	-2352	55	-2902	791	1381	518	-666	322	-3452	-2781	473
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1288	-9527	-763	-894	-1115	-4529	-64	*	*												
326	-1841	-2600	-1835	-2154	-4644	1586	-2893	-4556	-3135	-4654	-3836	2243	3218	-2685	-3520	-1961	-2222	-3536	-4706	-4269	474
-	-149	-500	232	43	-372	398	105	-627	210	-466	-714	277	393	45	95	359	117	-370	-295	-250	
-	-3410	-1305	-996	-53	-4787	-1602	-576	*	*												
327	-1431	891	-42	1025	456	1017	-1064	-2967	-646	-2914	-1989	2083	-2498	1034	692	218	-1370	-2520	-3084	-2402	476
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-8991	-10033	-894	-1115	-4118	-86	*	*												
328	-355	-1974	-2372	-1796	2376	-2890	-1625	-1567	1866	-1854	1506	675	-2961	-1491	383	-1881	-1570	1115	-2366	-1940	477
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9057	-10099	-894	-1115	-2560	-268	*	*												
329	-1797	-2342	-415	287	2146	-1027	-1712	-51	-142	-441	-1509	-1885	-3066	709	-1954	-458	155	-585	3483	743	478
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9370	-10413	-894	-1115	-925	-1079	*	*												
330	176	-3702	-92	-245	-920	-1338	-1891	146	745	-1033	-231	832	-3324	1918	751	425	-935	-626	-3891	12	479
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-41	-10054	-5194	-894	-1115	-2687	-243	*	*												
331	-2358	-2946	488	-965	-3010	1948	775	-389	-803	672	921	-883	-3613	-2003	-2483	-296	-51	-1063	773	1369	480
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10061	-11103	-894	-1115	-1687	-537	*	*												
332	-225	-3817	367	-10	-624	1049	412	-814	1051	-3829	-2908	1912	-3434	-1544	-2091	14	446	5	-4005	-591	481
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-178	-10186	-3115	-894	-1115	-3306	-154	*	*												
333	-2215	-3689	592	-269	-4010	-257	-1848	-3760	469	-56	-2778	781	1787	-206	-283	1184	857	-3311	-3872	-3189	482
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-157	-10010	-3296	-894	-1115	-3810	-107	*	*												
334	-1053	451	-173	368	985	-582	-1891	623	-1580	-3052	-2247	-1944	-988	2031	471	86	-2075	-1017	2776	1210	483
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9856	-10898	-894	-1115	-3279	-157	*	*												
335	-2120	-3592	1872	-676	-3913	-343	-1752	-3664	159	-823	613	947	-3187	752	658	1133	969	-3214	-3776	-3093	484
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2547	-9895	-273	-894	-1115	-4043	-90	*	*												
336	-796	-2121	-552	-63	-2376	-1691	-301	-2144	1349	-2097	-1233	2085	-1798	2049	-91	-685	-720	-1755	-2222	1482	485
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-697	-7361	-1408	-894	-1115	-4530	-64	*	*												

Table 4, Sheet 23/32

337	997	-1241	-578	-133	-1517	-1399	-332	-1234	-83	-1405	-619	1518	-1603	-5	-515	1020	-399	-944	-1722	1779	486
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-17	-6997	-8039	-894	-1115	-4345	-73	*	*												
338	-813	-1193	-2517	-2345	-1917	-1837	-1987	1819	-2146	-1614	-1167	-1892	-2390	-2008	-2230	2830	-1076	-631	-2498	-2045	487
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-13	-7341	-8383	-894	-1115	-3330	-151	*	*												
339	-927	2366	1639	-228	-2602	-1871	-568	-2325	861	-2315	-1422	-531	-1988	1344	-650	-823	1925	-1917	-2518	-1861	488
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-8	-8030	-9072	-894	-1115	-177	-3112	*	*												
340	1374	-2592	-5077	-4443	-124	-1761	-3175	-215	-4045	926	3415	-659	-1379	-3673	15	-988	-784	-456	1250	-2707	489
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-179	-3103	*	*												
341	669	-4072	-1127	-1928	-4384	267	-2258	64	1359	-759	-3164	775	-1426	250	1455	313	-2560	-1811	-4261	1229	490
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
342	-60	-4092	1793	555	-4413	-721	591	-4164	866	-942	-3181	766	-3686	1529	137	-1018	189	-3714	415	58	491
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
343	-2877	521	-228	-4579	1897	-1418	-3294	630	-1972	2065	336	-4067	-1693	-1394	-3978	-1988	-1133	-260	984	733	492
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
344	1114	-3970	600	-1986	-1332	-3628	-2293	-3951	1865	-1722	14	1176	-3720	-798	-921	-102	-163	500	-4186	1177	493
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
345	152	-4092	1011	793	-4413	428	44	-1477	194	-2362	-3181	1669	-3686	1065	-2339	509	905	-2008	-4275	-3593	494
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
346	-218	-2875	-4193	-3609	-142	-1211	-323	115	-123	-219	2818	279	-949	-1143	504	97	-293	-61	2641	338	495
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
347	71	-2705	-5213	-4578	495	657	-3294	1948	-1135	616	1591	-4067	-1693	-3799	-1274	-1209	587	-343	990	585	496
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-63	-10485	-4576	-894	-1115	-701	-1378	*	*												
348	388	-4039	1017	598	-4360	-547	971	-1236	-306	-1981	871	1250	108	791	-1067	631	642	-3661	-4222	-3539	497
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10423	-11466	-894	-1115	-1793	-491	*	*												
349	-1398	-4039	1347	-135	-4360	1020	1623	-1212	777	-371	-3128	55	-3633	489	-321	861	-557	-3661	-4222	379	498
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10423	-11466	-894	-1115	-287	-2470	*	*												
350	-2724	-3331	-141	-323	272	-574	-2612	-786	-1221	-688	1421	-1323	-3974	125	-182	-1029	643	802	4091	546	499
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
351	623	-3456	-2964	-82	-57	615	-2532	245	-308	327	533	-572	-3911	2001	-57	-1306	-932	-531	-3791	661	500
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 24/32

352	-156	-4088	25	301	1032	748	486	-4157	319	-991	690	-11	-3687	-39	-1267	1019	341	-3709	258	879	501
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
353	386	-4061	421	-302	231	438	-2261	-4109	188	-549	1388	60	-3694	-71	552	426	-337	-783	1504	789	502
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
354	-879	1409	-4984	-1583	-578	-465	1302	-627	-886	449	1708	-3959	1019	-3674	-391	-214	-226	-420	139	2373	503
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-25	-10485	-5900	-894	-1115	-701	-1378	*	*												
355	-1603	-4071	789	-90	-4392	-438	525	-4142	-667	-4087	1182	151	2162	-213	-573	1170	360	-1328	353	-654	504
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-78	-10461	-4264	-894	-1115	-1234	-799	*	*												
356	164	-4006	1385	874	-4327	15	930	-4077	-92	-633	-3095	1912	-795	-668	-2253	633	-2472	-3628	-4189	918	505
-	-148	-501	232	42	-382	398	105	-627	211	-467	-721	276	395	51	95	359	120	-370	-295	-250	
-	-2406	-2237	-739	-24	-5935	-502	-1768	*	*												
357	1136	-3077	193	959	-3392	-16	-1254	-3138	-838	-3090	-2168	-1232	-210	698	362	-1502	1125	1299	-3264	-2585	507
-	-149	-500	235	43	-381	398	105	-627	210	-466	-721	278	393	45	96	359	117	-370	-280	-250	
-	-285	-2486	-10292	-60	-4624	-1155	-860	*	*												
358	-701	-3609	1115	-1443	-88	-14	299	-1392	895	-3624	-2699	1357	799	704	-164	-915	153	837	-3794	-3113	509
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9922	-10964	-894	-1115	-1613	-571	*	*												
359	-1231	884	947	1343	1375	199	-1959	-1477	-501	-939	-2788	-729	-3388	932	-61	-647	-291	-1379	1301	949	510
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10112	-11154	-894	-1115	-79	-4227	*	*												
360	-422	-4082	-177	-744	-4399	-3596	812	-1474	1670	-1007	-3172	1163	-3689	-635	940	-409	-349	259	3343	-879	511
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
361	2063	-3835	-284	-2073	-4049	-3672	-2345	-3729	-1980	256	1615	1147	-3762	1155	-721	539	-297	-1175	-4086	-3475	512
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
362	-83	-2706	-5208	-4573	1133	57	-3293	500	-4171	-12	480	508	-4473	-3797	-1508	-985	358	2404	-3163	-2821	513
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
363	-2922	-2751	-5249	-4619	-2714	-4471	-3353	366	-4221	-66	-1957	1891	-4523	-3850	-4031	-463	2587	1278	2337	-2881	514
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
364	-6591	-5749	-7397	-7594	3911	-7189	-3596	-5428	-7161	426	-4871	-5931	-7055	-729	-6595	-6411	-6467	69	2012	1759	515
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
365	-1388	-3732	-6389	-5783	-175	-5697	-4594	1828	-5425	1541	186	-5350	-5603	-4940	-5204	-4820	-3937	2430	2295	-3993	516
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
366	-1199	728	2819	1540	-4376	1163	-2266	-1160	-1852	-4079	-3161	-230	-3698	-1810	-909	-1034	-1084	-1474	-4260	-3585	517
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 25/32

367	-3525	-4145	-6117	-6472	-6811	-4397	-6004	-6617	-6593	-6893	-5938	3991	-5207	-6045	-6340	1494	-990	-1177	-7031	-6952	518
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
368	-8351	-7039	-8010	-8359	-4914	-7245	5446	-8380	-8236	-7682	-7739	-7788	-7602	-7853	-7738	-8455	-8411	-8363	437	-4466	519
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
369	-5713	-7209	4171	-1139	-7691	-5309	-4876	-7880	-5377	-7635	-7175	-4028	-5899	-4617	-6337	-5333	-5830	-7322	-7358	-6716	520
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
370	-2724	-3336	-3119	-2562	-3404	-1240	-2610	-941	-2438	-1922	2315	1570	-1231	2033	-868	-637	2484	-1128	-3694	-3212	521
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-36	-10485	-5377	-894	-1115	-701	-1378	*	*												
371	-192	-4062	-600	735	-4383	533	-2221	-4133	-171	-4078	1177	830	1627	1762	-623	64	-2528	-849	-4245	550	522
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-125	-10450	-3599	-894	-1115	-1420	-675	*	*												
372	-1141	-3709	-4623	-4041	-4379	-4271	-3670	-3967	-3223	-4210	265	-3864	529	-3489	3785	-1709	105	-3678	-4619	-118	523
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1658	-10326	-551	-894	-1115	-2638	-253	*	*												
373	82	-2585	-1301	254	-2969	1681	-1268	1213	-960	-2739	-1898	2254	-2584	-871	-1448	403	-1457	-2290	-3024	-2414	524
-	-149	-500	233	43	-381	401	105	-626	210	-466	-721	275	394	45	96	359	117	-369	-295	-250	
-	-1076	-2568	-1486	-91	-4030	-5056	-44	*	*												
374	-1367	-2757	-684	762	-3061	-2109	3698	-2796	-450	-2756	-1901	-755	-2306	1644	-881	-1230	1816	-2389	-2927	-2269	526
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-8	-8039	-9081	-894	-1115	-4127	-85	*	*												
375	1394	-1810	-3140	-2842	1387	2255	-2607	-2887	-2712	-3150	-2360	-2340	1262	-2491	-2885	894	-1555	-2316	-3527	-3183	527
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-7	-8232	-9274	-894	-1115	-3538	-130	*	*												
376	849	-1609	-3510	-3089	-1549	1636	-2112	-1290	-2796	2090	-970	-2625	-3110	-2498	-2731	-2012	-1618	-1193	-2101	1259	528
-	-150	-501	232	44	-382	401	105	-627	214	-467	-721	274	393	48	97	358	116	-370	-295	-250	
-	-1693	-536	-9575	-26	-5789	-2879	-211	*	*												
377	-226	-3139	1871	1010	-3451	1305	-1240	-3212	-871	-3152	-2238	1334	134	921	-1397	81	-1585	-2757	-3321	-2616	530
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-8935	-9977	-894	-1115	-86	-4118	*	*												
378	-809	-2678	397	-4494	2346	529	-3251	1288	-4103	-791	89	-897	-4434	-3738	-3925	880	-2783	1385	-3135	-2791	531
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10447	-11489	-894	-1115	-369	-2148	*	*												
379	562	-3868	-462	-775	-69	-236	-422	-464	-709	1303	473	-855	-1549	127	-937	83	468	-107	-4111	-249	532
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
380	-743	-3979	-1125	-92	-111	-3625	-2289	-874	-1891	-3974	-3082	-613	-987	1020	-679	1753	2083	394	850	-3542	533
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
381	-962	658	-514	224	10	-4134	1018	-475	-3061	495	-333	-3271	-4202	431	2132	-150	-966	738	-3403	395	534
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 26/32

382	268	2114	-4241	20	1894	-630	232	-2390	-3421	223	1430	762	-4307	17	-3539	-3281	1630	-2291	377	-815	535
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
383	-86	-3754	-986	-2134	-253	2389	-2380	-1076	-705	-3711	-2881	-246	-3791	-531	-2512	755	-2599	-3301	3597	561	536
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
384	237	-4070	1550	-54	-92	1244	-2259	-4124	785	-1746	725	167	902	-1802	-59	-911	-2560	-1720	353	-177	537
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-72	-10485	-4386	-894	-1115	-701	-1378	*	*												
385	-63	-4029	2080	-1002	334	-1340	-117	-1612	739	-1661	-3118	1729	-1558	34	-1142	84	229	-611	-4213	-3531	538
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10415	-11457	-894	-1115	-1898	-451	*	*												
386	-773	-4031	-704	-52	-4352	698	-2190	201	967	-4047	-3120	312	1382	1007	1503	529	-2497	-1484	-4214	-3532	539
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-881	-10415	-1133	-894	-1115	-1898	-451	*	*												
387	741	-3304	1598	-1134	-3623	-614	-1467	-3373	-107	-1031	-2393	849	1064	-1008	474	1233	-55	-2925	-3488	-2806	540
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1176	-9537	-847	-894	-1115	-4520	-64	*	*												
388	-1675	-3241	2685	911	-3524	547	-1205	-3308	-962	-68	-2368	673	-2559	1497	-1539	-1496	-1645	-2848	-3420	-2662	541
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-893	-8368	-1126	-894	-1115	-5157	-41	*	*												
389	1055	-1975	-432	972	-2289	-1557	-243	-2015	1436	-1999	-1100	-219	560	202	-320	-492	1175	-1600	-2198	-1539	542
-	-151	-505	234	40	-386	407	100	-632	205	-471	-715	279	393	51	90	364	119	-375	-269	-243	
-	-2651	-632	-2354	-3521	-132	-4314	-74	*	*												
390	3077	-1244	-3035	-3163	-3572	-1512	-2789	-3308	-3117	-3599	-2716	-2079	-2284	-2759	-3042	1540	-1074	-2263	-3808	-3620	568
-	-147	-500	232	45	-381	398	105	-627	212	-466	-721	277	393	45	95	359	117	-370	-295	-250	
-	-2640	-257	-8518	-44	-5048	-2662	-248	*	*												
391	837	-2471	292	1046	-2759	-2064	-726	-2487	1705	-2473	1101	-712	-2156	-277	373	-974	-1017	396	-2674	1075	570
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-6	-8461	-9503	-894	-1115	-5129	-42	*	*												
392	-3113	-2830	1818	-4013	1528	-4239	-1573	-2480	-3727	986	-2078	186	-4225	-3165	-3598	-3353	-3036	-2449	2248	3302	571
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-6	-8461	-9503	-894	-1115	-3497	-134	*	*												
393	1024	-2812	841	-685	-3146	-2343	-968	-2875	723	-2815	975	-982	-2432	1215	2615	-1268	-1317	-2443	-2971	-2324	572
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8715	-9758	-894	-1115	-5040	-45	*	*												
394	-1389	-2365	-1493	1183	-2536	-2440	-1087	640	869	-2303	-1500	-1174	-2521	995	809	-1382	-1321	1849	2205	-2088	573
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8715	-9758	-894	-1115	-3388	-145	*	*												
395	-252	-2857	465	727	-3176	-2365	-1023	659	1621	-2872	-1947	-1002	844	1191	1114	-1272	-1330	-2478	2000	-2361	574
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-8936	-9978	-894	-1115	-533	-1694	*	*												
396	835	-3773	288	-1664	-570	-3328	-71	-3812	1798	672	321	-1971	-3421	504	1116	821	-2286	-3385	-3968	-3297	575
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10162	-11204	-894	-1115	-608	-1540	*	*												

Table 4, Sheet 27/32

397	823	-3170	-879	-864	-3221	-1232	-2575	1277	-838	530	-193	-665	-3925	-2353	-177	-750	-116	986	-3543	1959	576
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10384	-11426	-894	-1115	-2206	-353	*	*												
398	-2534	-3999	1738	-525	-4317	-3509	-2167	-7	2491	-1778	797	-2145	-29	-526	1325	-1394	-495	-3619	-4184	-3503	577
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10384	-11426	-894	-1115	-699	-1380	*	*												
399	-258	-2854	-4113	-3531	-2836	-1419	106	-1220	-3309	2276	2476	66	-4253	1410	-3454	-795	-758	-2284	-3287	-2908	578
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10447	-11489	-894	-1115	-369	-2148	*	*												
400	2748	75	-1809	-4507	-2673	1064	-3284	-415	-4122	585	-1920	-4034	-4466	-750	-3952	-3496	-2818	-566	-3175	-681	579
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
401	1007	-2722	-5068	-4442	-260	-922	-3266	-1143	-4070	417	924	1587	-4454	-862	-171	-6	-794	-314	1884	2319	580
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
402	2091	-2826	-4410	-350	-2798	-765	-3108	886	-1305	-185	571	-1268	-4343	-3320	-3627	-142	257	1282	-3267	-2900	581
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
403	-316	-2736	-5254	-4620	2973	-4458	-3317	833	-4215	1354	-1929	-4102	-4507	-3835	-4014	-1749	-2851	505	890	1656	582
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
404	-2877	-2707	-5197	-688	-2661	-4422	-3292	2104	-4164	1293	2607	-4060	-4472	1015	-3972	-762	653	-558	870	-503	583
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
405	-102	-249	-5221	-4585	1419	-4427	1872	-67	-4181	2348	1741	-1301	-4477	-259	-3983	-3512	-2821	-1289	-3164	-2822	584
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
406	1121	-2789	-4966	-4359	-2774	272	-3299	-1241	-4015	817	573	-3967	-4463	-3694	-1461	860	2532	-2226	-3266	-2918	585
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
407	-1162	504	-5204	-4569	278	-1169	2392	-705	-4168	978	1453	-1329	-4472	-3794	1338	1072	-2817	-857	2168	578	586
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
408	-197	-4091	834	483	-4411	-3593	-2252	-1792	-929	-1839	-3180	-524	2750	-56	1482	-663	-287	-1727	-4274	-3592	587
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1579	-10485	-590	-894	-1115	-701	-1378	*	*												
409	108	-1882	-2115	-1557	277	1324	-1460	-1493	-1415	-235	-1061	540	-2792	356	-1750	116	-1418	-1344	-2264	2967	588
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-8910	-9952	-894	-1115	-29	-5632	*	*												
410	-1283	-4239	-1531	-5491	-6763	3626	-5627	-6578	-6019	-6793	-5871	-4794	-5195	-5548	-437	-1285	-4041	-1415	-6951	-6754	589
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
411	-611	-2728	-5019	-4396	-875	-4395	-346	1500	-4034	-2578	475	966	-4447	-712	-1081	19	2168	1067	647	877	590
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												

Table 4, Sheet 28/32

412	-463	-3750	-5545	-5211	-4778	-1375	-4650	-4375	-1470	-1705	-3960	-4554	3885	-4708	-5002	-885	-483	-587	-5170	-4852	591
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
413	-406	2352	-733	-3127	323	-4097	-2866	504	-467	159	-2214	-493	-1071	794	174	-46	-1390	1009	-3440	1877	592
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
414	-4702	-4203	-7370	-7027	262	-7166	-7004	3284	-6962	-3594	268	-6819	-6917	-6860	-7081	-6511	232	2105	-6428	-5951	593
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
415	-7127	-6045	-7502	-7856	2309	-7386	-309	-6013	-7401	-5320	1996	-5995	-7240	-538	-6768	-6634	-6976	-6169	-2816	4339	594
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
416	-1722	-4302	-3604	-3359	-4183	-1214	-3510	-4733	-3410	-4822	-4070	-46	-4701	1972	-3807	1462	-3584	-4336	1026	3906	595
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
417	-1586	-4606	633	-4189	-6820	3298	-4973	-6677	-5288	-6784	-5927	-4169	-38	-4749	-53	525	-4212	-5576	-6941	-6442	596
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
418	-2645	-4116	2070	1526	-1241	-3611	1940	-4185	-1860	-4131	-3206	-2247	-65	1591	-747	-2525	1067	-3737	-4300	1627	597
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
419	-2625	-4031	-1060	3238	-618	-1292	-2271	-4056	-681	-1825	1023	-542	-3702	-1821	-265	-1370	-1030	-1215	-4231	-936	598
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
420	-1034	-2720	-5079	-1279	1571	-1417	58	1638	-4078	-417	905	-844	-4456	2001	-3927	-491	-2813	-331	2033	1810	599
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
421	-2907	-4290	618	-962	-4563	2854	664	-4291	-2183	-1667	-3405	-2448	-1378	-2104	-2699	49	404	-3889	-4504	1570	600
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-50	-10485	-4914	-894	-1115	-701	-1378	*	*												
422	-474	598	-1486	-1922	308	-114	-3056	-1113	-3495	-4	3600	-1012	-4294	413	445	-1247	-830	-1236	2604	382	601
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10437	-11479	-894	-1115	-328	-2299	*	*												
423	238	-4087	1128	-891	-4406	-367	177	-1155	-238	-2200	-225	301	111	-579	-2341	744	2247	-1726	-4272	-3591	602
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-125	-10485	-3606	-894	-1115	-701	-1378	*	*												
424	-1091	-3993	833	-617	75	2430	-131	-4063	-51	-4009	-3083	1846	-3587	-162	-2243	-2402	-424	-3615	-4177	638	603
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10362	-11404	-894	-1115	-2391	-305	*	*												
425	-376	-3984	1222	-100	601	1631	-153	-4054	326	-4000	-3073	48	-566	613	-2233	-580	-473	500	-4168	393	604
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-30	-10362	-5680	-894	-1115	-2391	-305	*	*												
426	127	-3961	870	-877	-4283	489	-166	-4033	1214	-3977	113	1373	475	-558	533	-106	-314	-3583	1977	258	605
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1169	-10334	-851	-894	-1115	-2590	-262	*	*												

Table 4, Sheet 29/32

427	-459	-1653	-3572	-408	1776	1540	-2061	1132	-2665	-1506	970	-2687	-708	-294	-2642	-256	-1675	773	-2101	863	606
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-408	-9169	-2033	-894	-1115	-3333	-151	*	*												
428	-1483	-2965	465	1104	-3283	736	-1106	-3037	263	-2980	-2058	1862	689	-650	-1217	452	1160	-2586	-3148	-2458	607
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-309	-8946	-2391	-894	-1115	-4938	-48	*	*												
429	-1303	1409	1871	-648	-2928	-2279	-929	-2639	778	-2635	-1750	-940	-2373	-489	967	834	-1240	-2248	3918	-2204	608
-	-149	-501	233	44	-378	400	104	-628	212	-468	-722	277	394	47	94	358	117	-369	-296	-251	
-	-1363	-713	-9685	-784	-1254	-4263	-77	*	*												
430	-1378	-1464	1505	-149	-1448	-383	-1564	2094	-1845	353	-656	-2001	191	-1651	-2009	-1790	-1319	496	1890	-1511	612
-	-148	-501	233	47	-382	400	104	-628	209	-467	-722	276	392	44	94	359	122	-369	-296	-251	
-	-3892	-196	-4066	-18	-6308	-4205	-80	*	*												
431	-1247	-2712	176	907	-3030	460	-881	-2778	772	-2727	930	-858	-2315	649	651	1202	-1186	972	-2898	-2217	614
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-5	-8729	-9771	-894	-1115	-997	-1003	*	*												
432	-1003	-2598	3026	-2324	-66	-1180	-2211	-860	-2179	-1281	-1775	-2452	1008	33	-2508	-2445	-552	-2055	-2990	1948	615
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-9851	-10893	-894	-1115	-2650	-250	*	*												
433	-4259	-6085	168	-389	-6338	-1353	-3437	-6205	-1184	-6026	-5374	-2764	3905	-3099	443	-3918	-4304	-5704	-6158	-5251	616
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2578	-9938	-266	-894	-1115	-3963	-96	*	*												
434	-767	-1577	-1043	-1067	-3143	1519	-1529	-2894	-1441	-3025	-2184	3091	-2118	-1234	-1831	-873	1385	-2164	-3243	-2736	617
-	-150	-502	232	42	-383	400	112	-623	209	-468	-723	278	394	43	93	358	118	-362	-297	-252	
-	-2537	-712	-2204	-2592	-262	-5349	-36	*	*												
435	-516	-984	-1115	-725	-1277	-1618	-728	1389	-611	-1043	-403	2411	-1864	-536	-925	-734	1361	-304	-1662	-1201	627
-	-149	-500	233	43	-378	398	105	-624	210	-466	-721	277	394	45	96	359	117	-370	-295	-250	
-	-2189	-746	-2440	-82	-4184	-3801	-107	*	*												
436	-842	-1512	-1081	-942	-2142	956	-1175	-1815	-1029	-2033	3596	2383	-2133	-939	-1362	-970	-987	-1484	-2412	-1909	629
-	-149	-500	232	43	-377	398	110	-627	210	-466	-721	277	395	45	95	360	117	-370	-295	-250	
-	-2587	-268	-8465	-46	-4987	-434	-1945	*	*												
437	667	22	2713	-265	492	-1542	-1977	-915	-345	-705	-2762	766	-3404	-320	-2078	-912	-2257	-3252	-3874	750	631
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10119	-11161	-894	-1115	-2057	-397	*	*												
438	163	2158	-139	334	-3981	-1132	428	691	-1645	-1918	-2818	2472	-3467	59	-2142	214	-946	312	-3932	-3284	632
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10192	-11234	-894	-1115	-2369	-311	*	*												
439	-2407	3398	-136	1040	-4126	-1288	-2049	-3861	-1638	-267	-2922	-2032	-3481	-62	2733	-1148	-976	-3437	-4023	-448	633
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10227	-11269	-894	-1115	-2362	-312	*	*												
440	-191	1100	-2291	1293	-977	303	-2067	945	786	-3856	-2944	291	-3499	486	540	-213	700	-1038	-4045	-712	634
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10255	-11297	-894	-1115	-3026	-189	*	*												
441	458	1520	-130	-1724	-4201	839	-2056	-3948	280	54	1209	449	-187	-122	606	683	410	-3504	-4070	-3390	635
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-186	-10255	-3060	-894	-1115	-1934	-438	*	*												

Table 4, Sheet 30/32

442	-848	-3504	1165	-27	589	-713	-2036	-749	-1675	-434	2480	2087	-3452	-1624	-577	196	365	-3065	-3759	-3152	636
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10119	-11162	-894	-1115	-3527	-131	*	*												
443	189	-3751	-781	227	-4059	-151	-1947	-1353	-1532	-3762	1222	908	1881	683	871	-1188	-1039	-1510	2049	1195	637
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10119	-11162	-894	-1115	-1708	-527	*	*												
444	-54	-2472	-1427	-4321	1165	248	-3054	-952	-3923	18	1178	-3820	-823	-908	-3734	-3268	33	-515	4459	1654	638
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10222	-11264	-894	-1115	-1427	-671	*	*												
445	-818	-3941	624	13	779	-979	-146	-1114	967	-1627	-3030	1286	-1468	599	716	1074	-503	-723	-4124	-3442	639
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-50	-10311	-4899	-894	-1115	-2734	-235	*	*												
446	812	2734	1602	985	-1033	170	424	-1653	-1827	-3541	-2706	-2203	275	-1774	-488	-369	-2401	-1049	1707	227	640
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10262	-11304	-894	-1115	-2217	-350	*	*												
447	-1344	-3417	267	1427	889	-3595	-2287	749	-113	-505	855	-506	-3681	-585	-2447	-520	832	-1416	-3725	2123	641
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10289	-11331	-894	-1115	-1655	-551	*	*												
448	497	-3964	-282	-89	28	-3465	2394	-4035	896	-3980	-3053	1233	744	1063	609	-1403	-812	-804	-4147	670	642
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-117	-10337	-3698	-894	-1115	-2571	-266	*	*												
449	446	-3864	535	716	-4185	-1034	-2025	-1451	913	-292	-235	-738	-3460	1106	1382	-483	982	-3486	-4048	-640	643
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-618	-10222	-1525	-894	-1115	-3170	-170	*	*												
450	-1976	-3458	2309	892	-3776	-61	-1599	-3530	-283	-3473	-2550	1526	-3027	-1143	698	602	739	-3079	-3640	-2951	644
-	-147	-509	242	49	-387	396	105	-633	214	-473	-701	274	385	42	94	360	125	-378	-261	-244	
-	-1274	-1480	-2132	-3030	-188	-4446	-68	*	*												
451	-159	-1691	-3708	-3099	1577	-3286	-2133	-73	715	120	910	-2784	-3340	-2483	-488	1106	1793	-78	-2141	-1787	659
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-4	-9234	-10276	-894	-1115	-3750	-111	*	*												
452	246	1159	372	1702	318	-2656	-1318	-3058	-914	-648	512	994	-26	-871	477	-444	700	-2651	-3255	-2595	660
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-3	-9312	-10354	-894	-1115	-981	-1019	*	*												
453	-1069	-2335	-4412	1	26	-3947	-2797	183	41	1807	224	-3463	-4001	-710	-3406	-1428	-885	-1752	2785	402	661
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10014	-11056	-894	-1115	-2224	-347	*	*												
454	277	-3251	-2499	-1946	1305	-1730	1022	590	824	-1777	-2394	-2198	-1131	140	1402	-451	-2290	-2769	-3560	2663	662
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-210	-10101	-2891	-894	-1115	-524	-1716	*	*												
455	-950	-3858	39	480	-4178	-1336	-267	-277	612	-244	-4	227	37	2036	179	175	205	-383	-4041	-3359	663
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10214	-11256	-894	-1115	-932	-1071	*	*												
456	728	-3966	-624	909	812	-1165	597	-542	105	-358	-3057	-137	-831	1711	170	-2393	-962	-527	-4154	853	664
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-2427	-297	*	*												

Table 4, Sheet 31/32

457	66	-2591	-5105	-4470	-188	-1573	-3183	2992	-1564	377	-1794	-3956	-4361	-3689	-3867	-107	-2705	805	-3049	493	665
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-2427	-297	*	*												
458	771	-3980	870	-586	-4301	-3482	-2141	-250	2057	-2375	-115	-992	-830	1327	-298	497	102	-3602	-4164	-721	666
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-2427	-297	*	*												
459	824	-3981	-2356	-648	-4302	961	-2141	-4052	1359	-3997	-3070	753	459	-578	667	926	246	-3603	956	-564	667
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-2	-10357	-11399	-894	-1115	-178	-3104	*	*												
460	-262	504	-5193	-4559	-2662	-1787	-3291	-193	-4160	1812	2808	-4058	-4471	-44	1634	-1315	-2817	405	-3165	-2822	668
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
461	608	-3114	1889	-2942	-3135	-1460	-2791	1522	-2790	-416	-2294	1311	-4111	-449	-3103	-610	-373	1203	-3513	-3084	669
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
462	1064	-4092	352	-287	-4413	692	1287	-4164	-609	-518	-3181	810	565	-79	69	879	-1440	-3714	-4275	333	670
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
463	1044	-2707	-5195	-1784	2589	-2059	-3291	959	-1193	1067	-1910	-4058	-4471	-3790	-3971	-646	-403	212	1583	-2821	671
-	-149	-500	233	43	-381	399	106	-626	210	-466	-720	275	394	45	96	359	117	-369	-294	-249	
-	-1	-10485	-11527	-894	-1115	-701	-1378	*	*												
464	-5309	-5869	-6219	-1531	-6756	-5764	2106	-1505	-2098	-5643	8	-4432	-5670	-483	3918	-5184	-4930	-5825	-5467	-5419	672
-	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
-	*	*	*	*	*	*	*	*	0												

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Table 4, Sheet 32/32